



products and services, and encourages others to use their products and services in an infringing manner, as set forth herein.

3. Plaintiff seeks past and future damages and prejudgment and post-judgment interest for Defendants' infringement of the Asserted Patents, as defined below.

## **II. PARTIES**

4. Plaintiff LED Wafer is a limited liability company organized and existing under the law of the State of Delaware, with its principal place of business located at 7215 Bosque Blvd., Suite 156, Waco, TX 76710.

5. LED Wafer is the owner of the entire right, title, and interest of the Asserted Patents, as defined below.

6. On information and belief, Defendant Samsung Electronics Co., Ltd. is a Korean corporation with its principal place of business at 129 Samsung-Ro Yeongtong-gu, Gyeonggi-do 16677 Suwon-Shi, Republic of Korea. Samsung Electronics Co., Ltd. may be served pursuant to FED. R. CIV. P. 4(f)(1).

7. On information and belief, Defendant Samsung Electronics America, Inc. is a New York corporation with its principal place of business at 85 Challenger Rd., Ridgefield Park, New Jersey 07660. Samsung Electronics America, Inc. is a wholly-owned subsidiary of Samsung Electronics Co., Ltd. Samsung Electronics America, Inc. may be served through its registered agent CT Corporation System, 1999 Bryan Street, Suite 900, Dallas, Texas 75201.



8. On information and belief, Samsung Electronics America, Inc. is registered to do business in the State of Texas and has been since at least June 10, 1996.

9. On information and belief, Samsung Electronics America, Inc. conducts business operations in the Western District of Texas in its facilities at 12100 Samsung Blvd., Austin, Texas 78754. Samsung Electronics America, Inc. has offices in the Western District of Texas where it sells and/or markets its products, including an office in Austin, Texas.

### **III. JURISDICTION AND VENUE**

10. This is an action for patent infringement that arises under the patent laws of the United States, in particular, 35 U.S.C. §§ 271, 281, 283, 284, and 285.

11. This Court has exclusive jurisdiction over the subject matter of this action under 28 U.S.C. §§ 1331 and 1338(a).

12. This Court has personal jurisdiction over Samsung Electronics Co., Ltd. in this action because Samsung Electronics Co., Ltd. has committed acts within the Western District of Texas giving rise to this action and has established minimum contacts with this forum such that the exercise of jurisdiction over Samsung Electronics Co., Ltd. would not offend traditional notions of fair play and substantial justice. Samsung Electronics Co., Ltd., directly and/or through subsidiaries or intermediaries (including distributors, retailers, and others), has committed and continues to commit acts of infringement in this District by, among other things, offering to sell and selling products and/or services that infringe the patents-in-suit.

Moreover, Samsung Electronics Co., Ltd. actively directs its activities to customers located in the State of Texas.

13. This Court has personal jurisdiction over Samsung Electronics America, Inc. in this action because Samsung Electronics America, Inc. has committed acts within the Western District of Texas giving rise to this action and has established minimum contacts with this forum such that the exercise of jurisdiction over Samsung Electronics America, Inc. would not offend traditional notions of fair play and substantial justice. Samsung Electronics America, Inc., directly and/or through subsidiaries or intermediaries (including distributors, retailers, and others), has committed and continues to commit acts of infringement in this District by, among other things, offering to sell and selling products and/or services that infringe the patents-in-suit. Moreover, Samsung Electronics America, Inc. is registered to do business in the State of Texas, has offices and facilities in the State of Texas, and actively directs its activities to customers located in the State of Texas.

14. Venue is proper in this District under 28 U.S.C. §§ 1391(b)-(d) and 1400(b) for both Defendants. Samsung Electronics Co., Ltd. is a foreign corporation not residing in the United States. Upon information and belief, Samsung Electronics Co., Ltd. has transacted business in the Western District of Texas and has committed acts of direct and indirect infringement in the Western District of Texas. Samsung Electronics America, Inc. is registered to do business in the State of Texas, has offices in the State of Texas, and upon information and belief, has transacted business in the Western District of Texas and has committed acts of direct and indirect infringement

in the Western District of Texas. Samsung Electronics America, Inc. maintains a regular and established place of business in the Western District of Texas, including an office located at 12100 Samsung Blvd., Austin, Texas 78754.

#### **IV. COUNTS OF PATENT INFRINGEMENT**

15. Plaintiff alleges that Defendants have infringed and continue to infringe the following United States patents (collectively, the “Asserted Patents”):

United States Patent No. 8,941,137 (the “137 Patent”) (Exhibit A)  
United States Patent No. 8,952,405 (the “405 Patent”) (Exhibit B)  
United States Patent No. 9,502,612 (the “612 Patent”) (Exhibit C)  
United States Patent No. 9,786,822 (the “822 Patent”) (Exhibit D)

#### **COUNT ONE INFRINGEMENT OF U.S. PATENT 8,941,137**

16. Plaintiff incorporates by reference the allegations in all preceding paragraphs as if fully set forth herein.

17. The ’137 Patent, entitled “LIGHT EMITTING DIODE PACKAGE AND METHOD OF MANUFACTURE,” was filed on March 6, 2012, claims priority to a provisional application filed on March 6, 2011, and issued on January 27, 2015.

18. Plaintiff is the assignee and owner of all rights, title, and interest to the ’137 Patent, including the right to recover for past infringements, and has the legal right to enforce the patent, sue for infringement, and seek equitable relief and damages.

#### **Technical Description**

19. The ’137 Patent claims a “light emitting diode (LED) device and packaging . . . manufactured using a vertical configuration including a plurality of

layers.” ’137 Patent, abstract. LEDs “compare favorably to other sources of light and are especially useful in certain applications and markets [by providing] advantages with respect to energy efficiency, compact, rugged long-lasting design and form factor, as well as other advantages.” ’137 Patent, 1:27-39. Prior art and “conventional LED devices [however] can be relatively costly to manufacture by some metrics when compared to other light sources. One reason for this is the exacting packaging requirements for manufacturing LEDs. [C]onventional techniques require the use of a carrier substrate to support the LED, which can double the cost of making and packaging the LED device. In addition, the carrier substrate greatly increases the thermal resistivity of the device and adversely affects its heat removal characteristics. Accordingly, there is a need for LED devices that do not suffer from [these] problems.” ’137 Patent, 1:27-62.

20. The ’137 Patent provides a technical solution to prior art problems by providing a LED having a plurality of layers. “Certain layers act to promote mechanical, electrical, thermal, or optical characteristics of the device. The device avoids design problems, including manufacturing complexities, costs and heat dissipation problems found in conventional LEDs.” ’137 Patent, 2:2-10. The layers may include “a semiconductor LED including doped and intrinsic regions thereof; a conducting carrier layer disposed proximal to a first surface of said semiconductor LED and separated therefrom by a metallic interface; an optically permissive layer proximal to a second surface of said semiconductor LED, said first and second surfaces of said semiconductor LED being on opposing faces thereof, an optically

definable material proximal to or within said optically permissive layer that affects an optical characteristic of emitted light passing therethrough; and an optically permissive cover substrate covering at least a portion of the above components.” ’137 Patent, 2:12-24.

### **Direct Infringement**

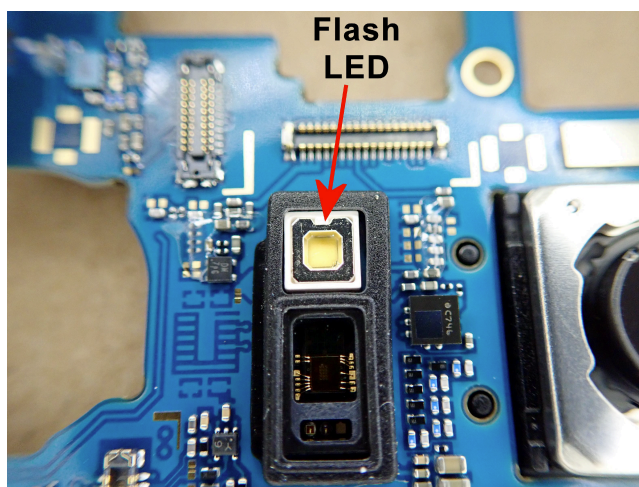
21. Defendants, individually and collectively as a common business enterprise and without authorization or license from Plaintiff, have been and are directly infringing the ’137 Patent, either literally or equivalently, as infringement is defined by 35 U.S.C. § 271, including through making, using (including for testing purposes), importing, selling, and offering for sale LEDs that infringe one or more claims of the ’137 Patent. Defendants, individually and collectively as a common business enterprise, develop, design, manufacture, sell, and distribute LEDs that infringe one or more claims of the ’137 Patent. Defendants further provide services that practice methods that infringe one or more claims of the ’137 Patent. Defendants are thus liable for direct infringement pursuant to 35 U.S.C. § 271. Exemplary infringing products include, but are not limited to, the Samsung Galaxy S8 mobile phone and Samsung LM101A Series LED.

22. Plaintiff names these exemplary infringing instrumentalities to serve as notice of Defendants’ infringing acts, but Plaintiff reserves the right to name additional infringing products, known to or learned by Plaintiff or revealed during discovery, and include them in the definition of ’137 Accused Products.

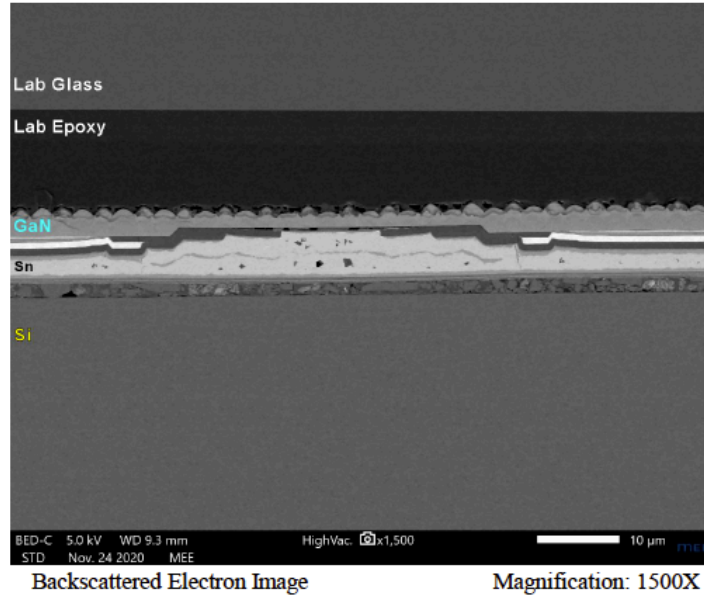
23. Defendants are liable for direct infringement pursuant to 35 U.S.C. § 271 for the manufacture, sale, offer for sale, importation, or distribution of the Samsung Galaxy S8 mobile phone and Samsung LED backlight strips.

24. The Samsung Galaxy S8 mobile phone has a flash LED that is a non-limiting example of a LED that meets all limitations of claim 1 of the '137 Patent, either literally or equivalently.

25. The Samsung Galaxy S8 has a light emitting device (LED) that serves as a flash for the camera, as well as a light source for various applications:

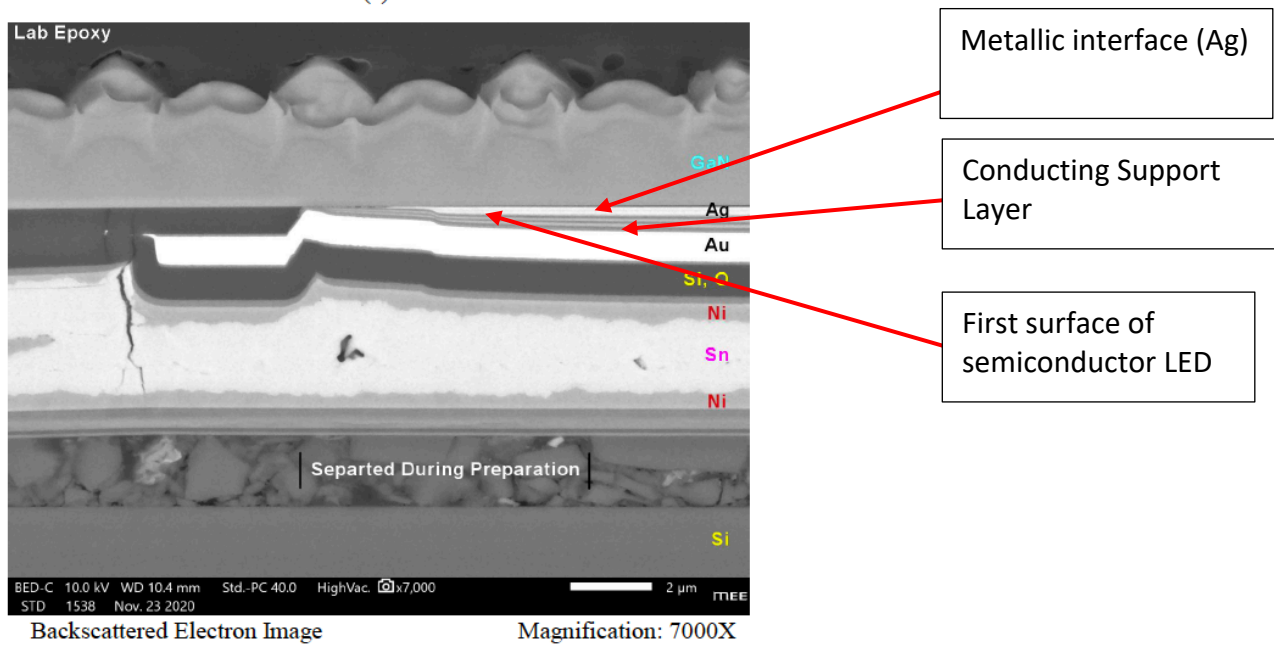


26. The Samsung Galaxy S8's LED is a semiconductor LED including doped and intrinsic regions. The semiconductor LED is a doped GaN LED. The LED has a positively doped region, a negatively doped region, and an intrinsic region between the positively doped region and the negatively doped region. The intrinsic region lies between the two doped regions:



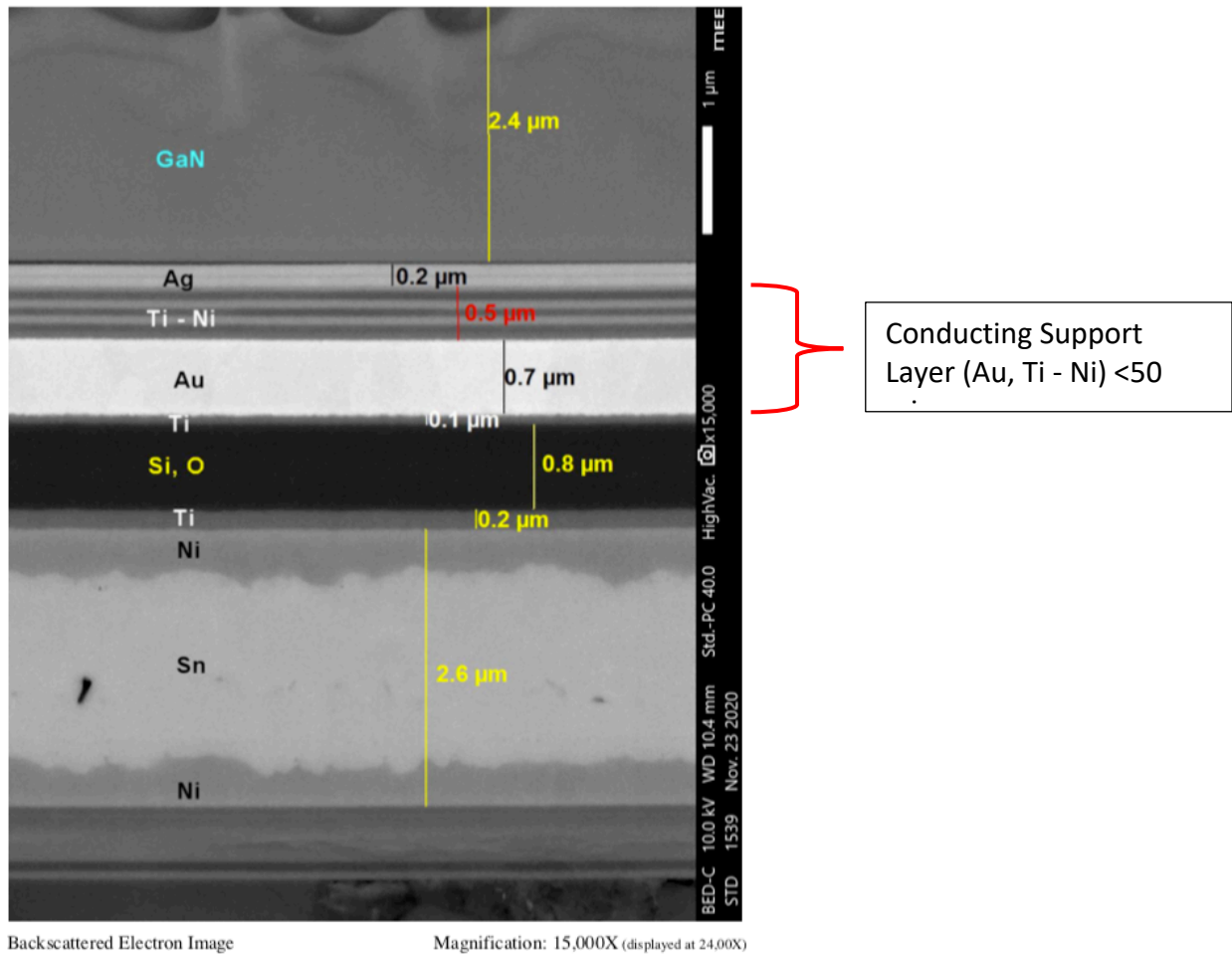
27. The negatively doped region of GaN corresponds to the cathode while the positively doped region of GaN corresponds to the anode of the LED. Such doping is required for a LED to function. The intrinsic region lies between the two doped regions.

28. The Samsung Galaxy S8's LED has a conducting support layer of no more than 50 microns in thickness disposed proximal to a first surface of said semiconductor LED and separated therefrom by a metallic interface with no additional intervening layers. The conducting support layer is at the electrode. At the electrode, the gold and other metals conducting support layer is right next to the silver metallic interface, which both conducts electricity and reflects any photons towards the phosphor doped layer. There is a conducting support layer of less than 50 microns made up of various metals next to one surface of the semiconductor LED. There is also a metallic interface made of silver.

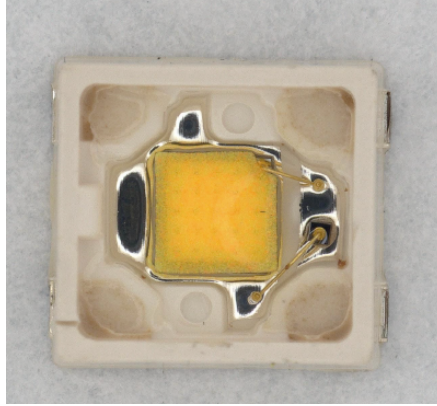


29. The conducting support layer is the gold and other metal layers (Ti - Ni).  
The metallic interface is the silver used to reflect any backscattered light.

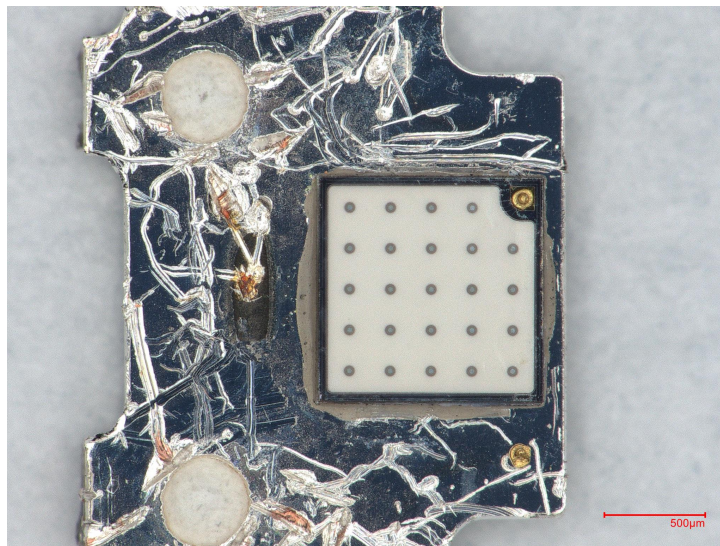




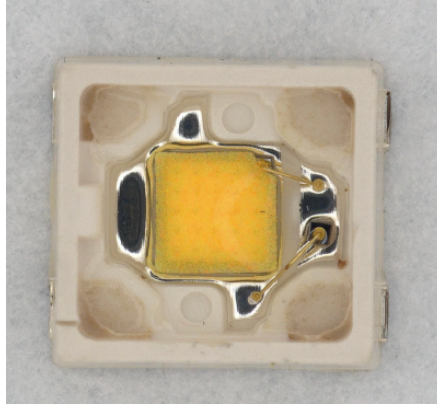
30. The Samsung Galaxy S8's LED has an optically permissive layer proximal to a second surface of said semiconductor LED, said first and second surfaces of said semiconductor LED being on opposing faces thereof. There is an optically permissive layer of yellow phosphorus on top of the semiconductor LED:



31. The optically permissive layer is on the opposing side of the LED from the conducting support layer. When the optically permissive layer is removed, the surface of the LED is exposed:

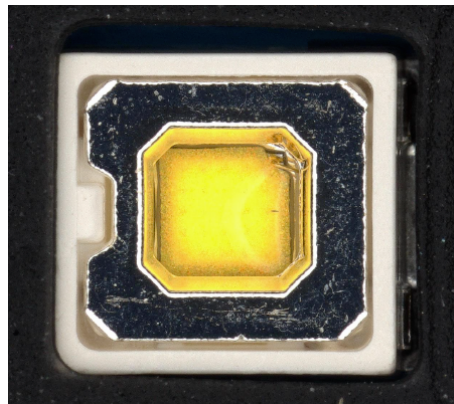


32. The Samsung Galaxy S8's LED has an optically definable material proximal to or within said optically permissive layer that affects an optical characteristic of emitted light passing therethrough. The optically definable material is yellow phosphor contained within the yellow portion covering the LED, which changes the blue light emitted from the LED into white light:

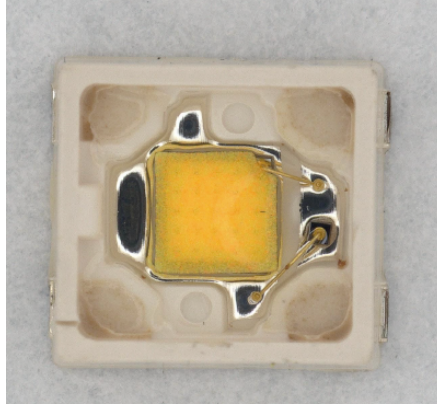


33. This is how white light LEDs are generally made (and why they appear to have a yellow surface).

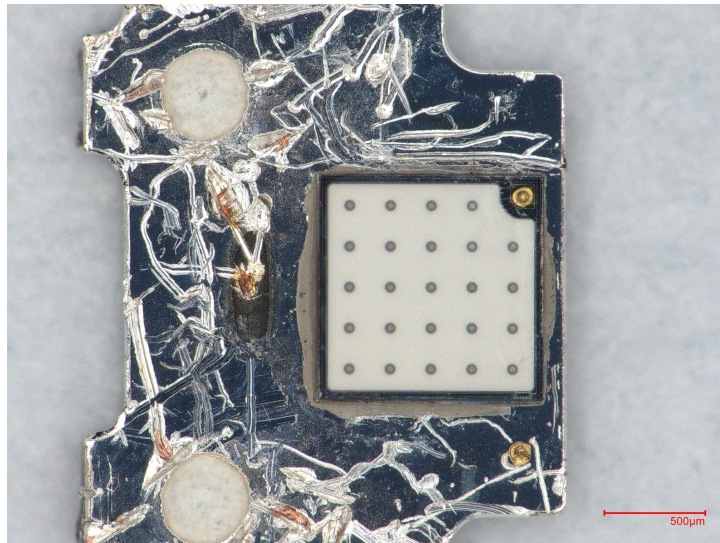
34. The Samsung Galaxy S8's LED has an optically permissive flat cover substrate covering at least a portion of the above components. There is a transparent cover substrate made of silicon that was removed to reveal the yellow layer doped with phosphorus. The flash LED is protected by an optically transparent cover substrate, as shown:



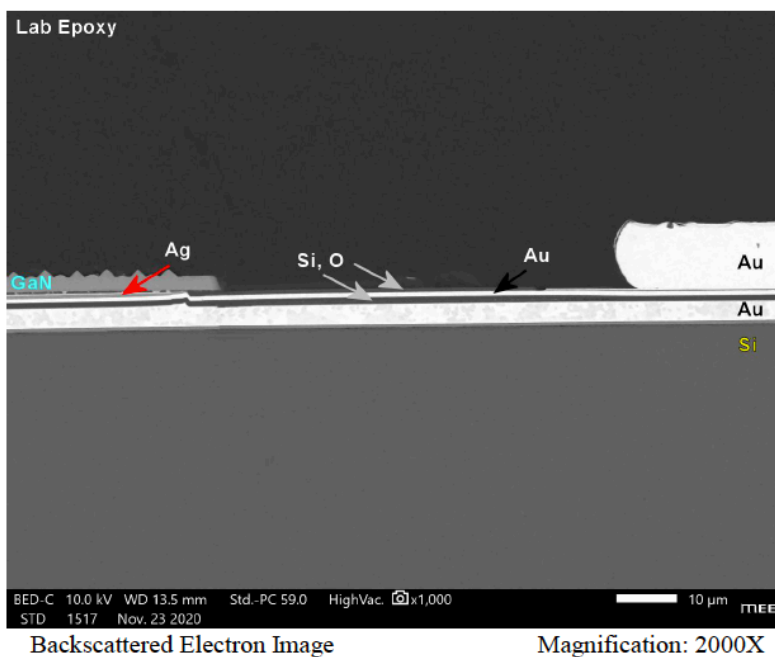
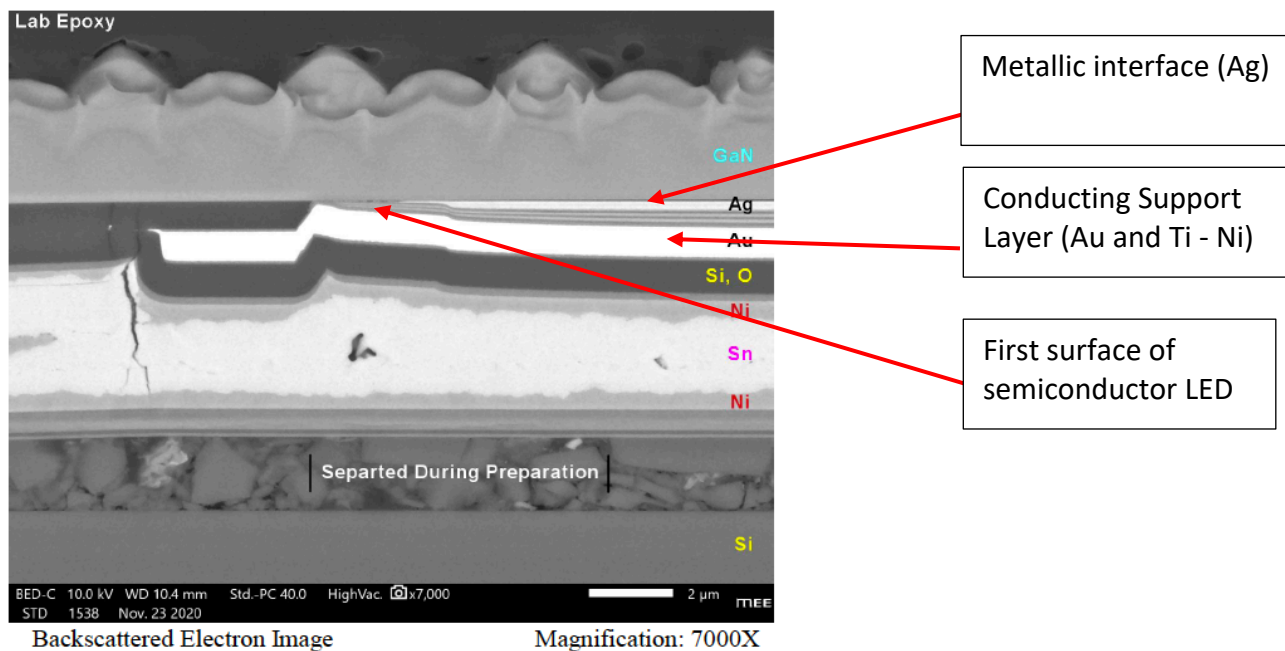
35. The optically transparent cover substrate may be removed to expose the remaining layers of the LED:



36. The Samsung Galaxy S8's LED has a metal pad between the semiconductor LED and said optically permissive layer:



37. The first surface of the Samsung Galaxy S8's LED, the metallic interface and the conducting support layer are all electrically coupled to one another:



### Willful Infringement

38. Upon information and belief, Defendants have had actual knowledge (or should have been aware) of the '137 Patent and its infringement since at least 2013.

39. By at least 2013, Viagan (the previous owner of the patents prior to their assignment to LED Wafer Solutions LLC) had a series of meetings with technical personnel at Samsung.

40. On information and belief, at least Peter JH Lee, a senior researcher at Samsung, had access to technical information from Viagan.

41. Upon information and belief, at least some of this technical material described Viagan's LED technology and clearly stated that Viagan had five pending patent applications.

42. Further, Defendants have had actual knowledge of the '137 Patent and its infringement since at least service of Plaintiff's Complaint.

43. Although Samsung has incorporated Viagan's patented technology as set forth in this Complaint, Samsung has no license to use the technology described in Viagan's technical materials and claims and disclosed in the patents, which have now been assigned to LED Wafer Solutions LLC

44. Defendants' risk of infringement of the patents-in-suit was either known or was so obvious that it should have been known to Defendants.

45. Notwithstanding this knowledge, Defendants have knowingly or with reckless disregard willfully infringed the '137 Patent. Defendants have thus had actual notice of the infringement of the '137 Patent and acted despite an objectively high likelihood that their actions constituted infringement of Plaintiff's valid patent rights, either literally or equivalently.



46. This objective risk was either known or so obvious that it should have been known to Defendants. Accordingly, Defendants' infringement has been and continues to be willful, and Plaintiff seeks enhanced damages pursuant to 35 U.S.C. §§ 284 and 285.

**Indirect, Induced, and Contributory Infringement**

47. Defendants have induced and are knowingly inducing their distributors, testers, trainers, customers, and/or end-users to directly infringe the '137 Patent, with the specific intent to induce acts constituting infringement, and knowing that the induced acts constitute patent infringement, either literally or equivalently.

48. Defendants have knowingly contributed to direct infringement by their customers by having imported, sold, and/or offered for sale, and knowingly importing, selling, and/or offering to sell within the United States the '137 Accused Products which are not suitable for substantial non-infringing use and which are especially made or especially adapted for use by its customers in an infringement of the asserted patent.

49. Defendants' indirect infringement includes, for example, providing data sheets, technical guides, demonstrations, software and hardware specifications, installation guides, and other forms of support that induce their customers and/or end-users to directly infringe the '137 Patent.

50. Defendants' indirect infringement additionally includes marketing their products for import by their customers into the United States. Defendants' indirect infringement further includes providing product specifications instructing its

customers on infringing uses of the accused products. The '137 Accused Products are designed in such a way that when they are used for their intended purpose, the user infringes the '137 Patent, either literally or equivalently. Defendants know and intend that customers who purchase the '137 Accused Products will use those products for their intended purpose. For example, Defendant's United States website, <https://www.samsung.com>, instructs customers to use the '137 Accused Products in numerous infringing applications. Defendants' customers directly infringe the '137 patent when they follow Defendant's provided instructions. Defendants specifically intend that their customers, such as United States distributors, retailers and consumer product companies, will import, use, and sell infringing products in the United States to serve and develop the United States market for Defendants' infringing products.

51. Defendants know following their instructions directly infringes claims of the '137 Patent and Defendants' customers who follow Defendants' provided instructions directly infringe the '137 Patent.

52. As a result of Defendants' infringement, Plaintiff has suffered monetary damages, and is entitled to an award of damages adequate to compensate it for such infringement which, by law, can be no less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

**COUNT TWO**  
**INFRINGEMENT OF U.S. PATENT 8,952,405**

53. Plaintiff incorporates by reference the allegations in preceding paragraphs 1 – 15 as if fully set forth herein.



54. The '405 Patent, entitled "LIGHT EMITTING DIODE PACKAGE AND METHOD OF MANUFACTURE," was filed on March 6, 2012, claims priority to a provisional application filed on March 6, 2011, and issued on February 10, 2015.

55. Plaintiff is the assignee and owner of all rights, title, and interest to the '405 Patent, including the right to recover for past infringements, and has the legal right to enforce the patent, sue for infringement, and seek equitable relief and damages.

### **Technical Description**

56. The '405 Patent claims a "light emitting diode (LED) device and packaging . . . manufactured using a vertical configuration including a plurality of layers." '405 Patent, abstract. LEDs "compare favorably to other sources of light and are especially useful in certain applications and markets [by providing] advantages with respect to energy efficiency, compact, rugged long-lasting design and form factor, as well as other advantages." '405 Patent, 1:32-44. Prior art and "conventional LED devices [however] can be relatively costly to manufacture by some metrics when compared to other light sources. One reason for this is the exacting packaging requirements for manufacturing LEDs. [C]onventional techniques require the use of a carrier substrate to support the LED, which can double the cost of making and packaging the LED device. In addition, the carrier substrate greatly increases the thermal resistivity of the device and adversely affects its heat removal characteristics. Accordingly, there is a need for LED devices that do not suffer from [these] problems." '405 Patent, 1:45-67.

57. The '405 Patent provides a technical solution to prior art problems by providing a LED having a plurality of layers. "Certain layers act to promote mechanical, electrical, thermal, or optical characteristics of the device. The device avoids design problems, including manufacturing complexities, costs and heat dissipation problems found in conventional LEDs." '405 Patent, 2:6-14. The layers may include "a semiconductor LED including doped and intrinsic regions thereof; a conducting carrier layer disposed proximal to a first surface of said semiconductor LED and separated therefrom by a metallic interface; an optically permissive layer proximal to a second surface of said semiconductor LED, said first and second surfaces of said semiconductor LED being on opposing faces thereof, an optically definable material proximal to or within said optically permissive layer that affects an optical characteristic of emitted light passing therethrough; and an optically permissive cover substrate covering at least a portion of the above components." '405 Patent, 2:15-27.

### **Direct Infringement**

58. Defendants, individually and collectively as a common business enterprise and without authorization or license from Plaintiff, have been and are directly infringing the '405 Patent, either literally or equivalently, as infringement is defined by 35 U.S.C. § 271, including through making, using (including for testing purposes), importing, selling, and offering for sale LEDs that infringe one or more claims of the '405 Patent. Defendants, individually and collectively as a common business enterprise, develop, design, manufacture, sell, and distribute LEDs that

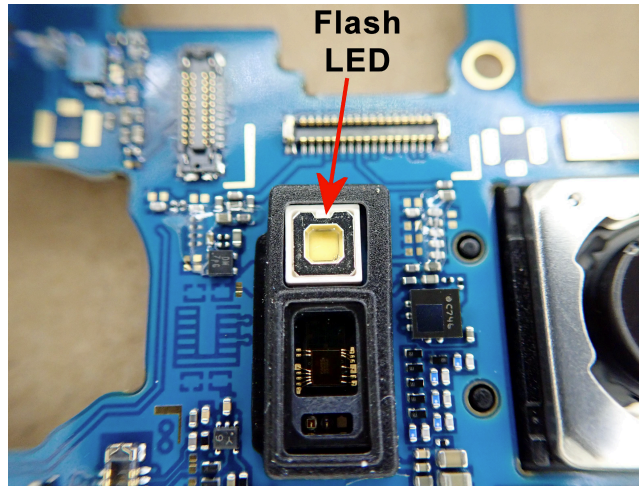
infringe one or more claims of the '405 Patent. Defendants further provide services that practice methods that infringe one or more claims of the '405 Patent. Defendants are thus liable for direct infringement pursuant to 35 U.S.C. § 271. Exemplary infringing products include, but are not limited to, the Samsung LM101A Series LED, Samsung LED backlight strips such as those used in the Samsung TU8000 Smart Television, and Samsung LED flash devices as used in the Samsung Galaxy S20 smartphone, Samsung Galaxy S9 smartphone, Samsung Note 20 smartphone, and the Samsung Galaxy Tab S7 tablet.

59. Plaintiff names these exemplary infringing instrumentalities to serve as notice of Defendants' infringing acts, but Plaintiff reserves the right to name additional infringing products, known to or learned by Plaintiff or revealed during discovery, and include them in the definition of '405 Accused Products.

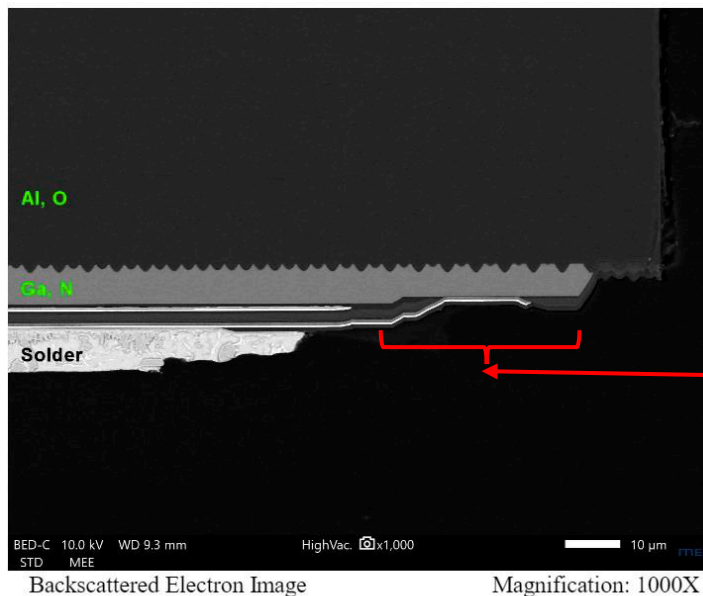
60. Defendants are liable for direct infringement pursuant to 35 U.S.C. § 271 for the manufacture, sale, offer for sale, importation, or distribution of the Samsung Galaxy S20 mobile phone and Samsung LED backlight strips and other similar products.

61. The Samsung Galaxy S20 mobile phone has a flash LED that is a non-limiting example of a LED that meets all limitations of claim 1 of the '405 Patent, either literally or equivalently.

62. The Samsung Galaxy S20 has a light emitting device (LED) that serves as a flash for the camera, as well as a light source for various applications:



63. The Samsung Galaxy S20's LED is a semiconductor LED including doped and intrinsic regions. The semiconductor LED is a doped GaN LED. The LED has a positively doped region, a negatively doped region, and an intrinsic region between the positively doped region and the negatively doped region. The intrinsic region lies between the two doped regions:

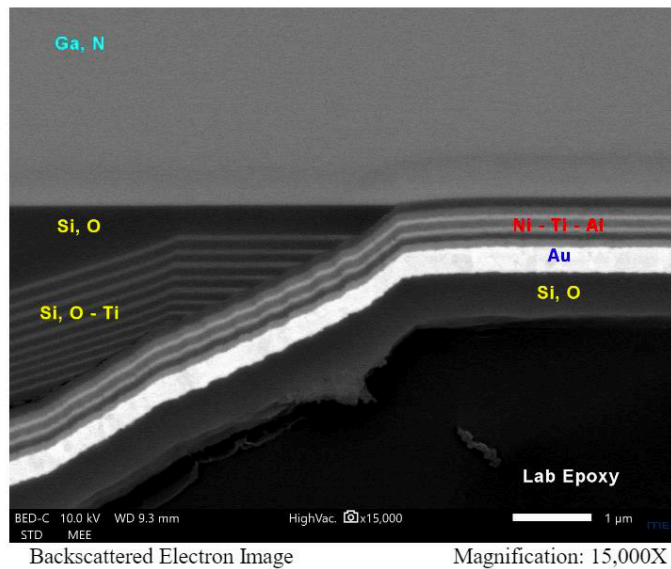


(b)

64. The negatively doped region of GaN corresponds to the cathode while the positively doped region of GaN corresponds to the anode of the LED. Such doping

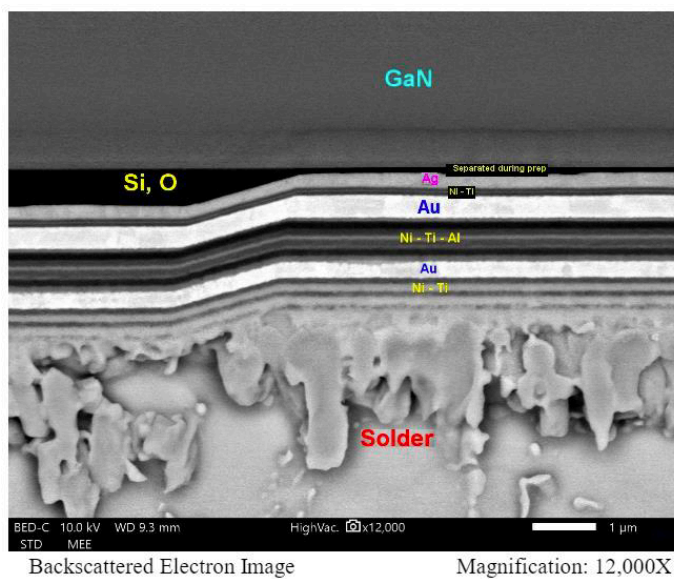
is required for a LED to function. The intrinsic region lies between the two doped regions.

65. The Samsung Galaxy S20's LED has a metallization layer which is an electrically conducting metallization layer. The metallization layer is in direct contact with portions of the GaN semiconductor that are positively and negatively doped.



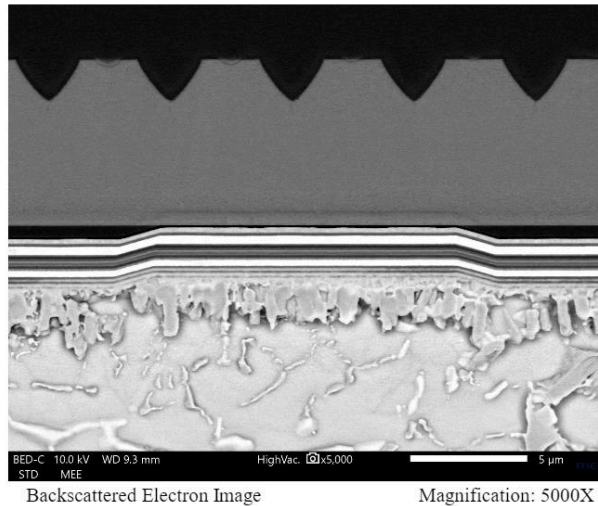
(b)

Electrically conducting metallization layer in contact with negatively doped surface

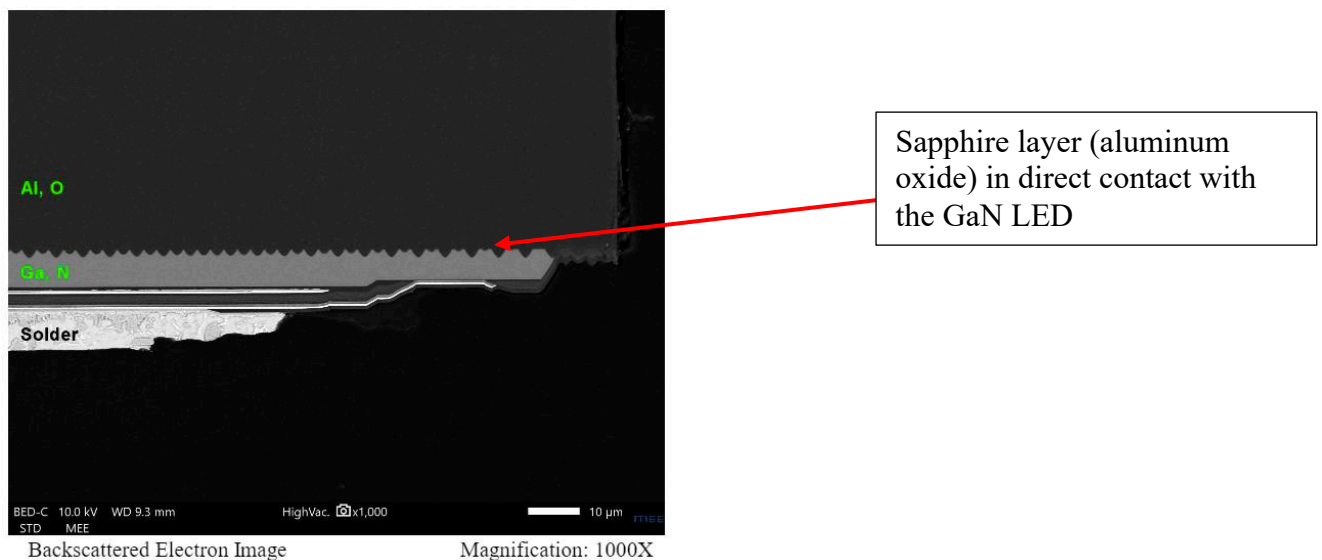


Electrically conducting metallization layer in contact with positively doped surface

66. The electrically conducting metallization layer is in direct contact with exposed surfaces of portions of both the positively doped and negatively doped GaN, and the positively doped and negatively doped surfaces are parallel with each other.

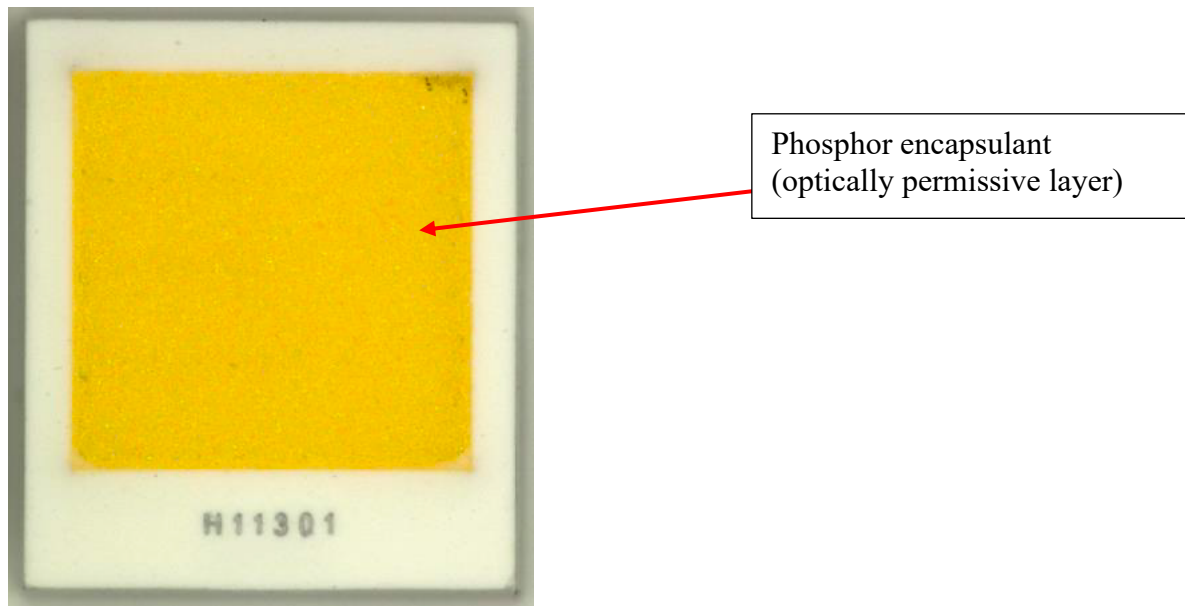


67. The Samsung Galaxy S20's LED die is a sapphire layer in direct contact with the first surface of the LED.



68. The positively doped surface is in contact with the electrically conducting metallization layer and is on the opposing side of the LED from the sapphire layer.

69. The Samsung Galaxy S20's LED chip is covered by a phosphor encapsulant in direct contact with the sapphire layer. The phosphor encapsulant is the optically permissive layer and the phosphor is the optically definable material. The phosphor changes the frequency of some of the light emitted from the LED that passes through the phosphor encapsulant. The yellow material over the chip is consistent with a phosphor-containing covering.



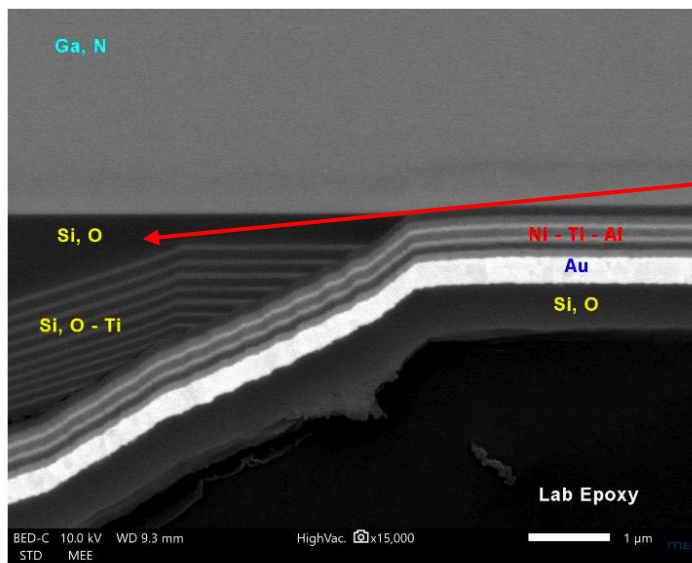
70. This is how white light LEDs are generally made (and why they appear to have a yellow surface).

71. The Samsung Galaxy S20's LED is covered by a clear lens in the outer case of the smartphone.



Cover substrate for the Galaxy S8 smartphone

72. There is a passivation layer of silicon oxide in direct contact with the metallization layer (gold contact) and GaN semiconductor LED of the Samsung Galaxy S20.



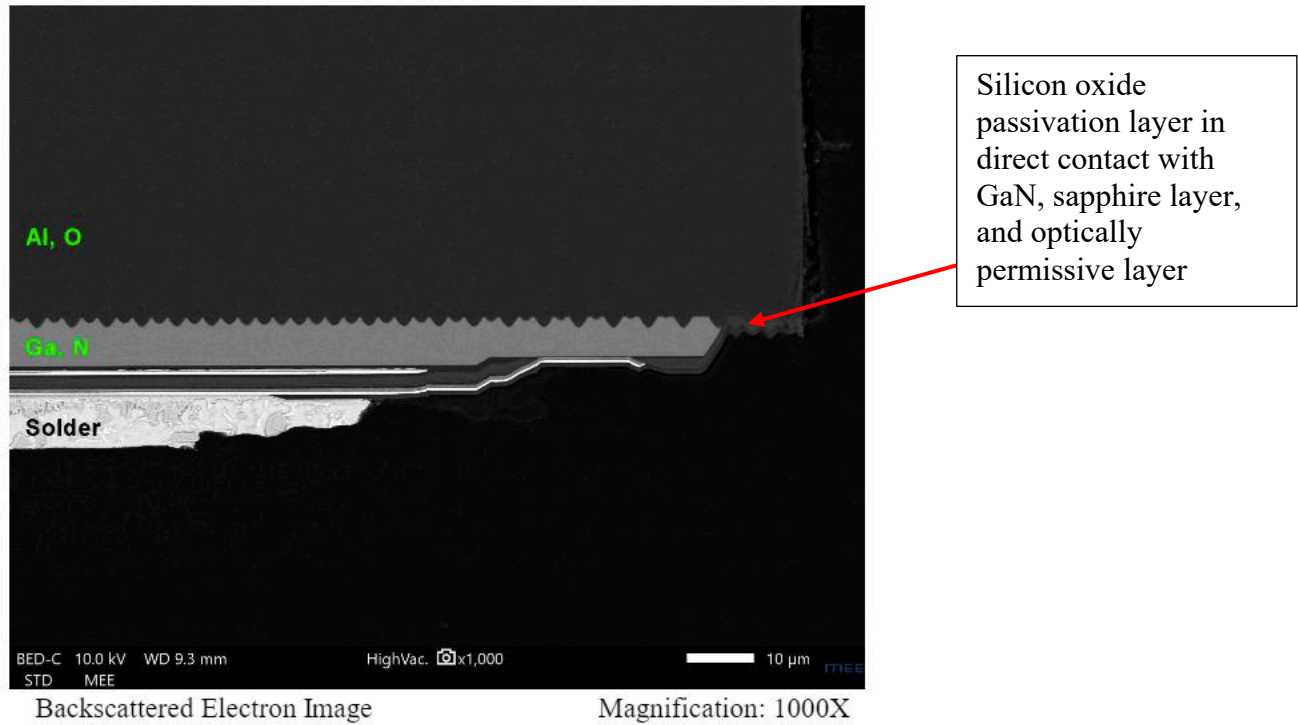
Silicon oxide passivation layer in direct contact with GaN and metallization layer

Backscattered Electron Image

Magnification: 15,000X

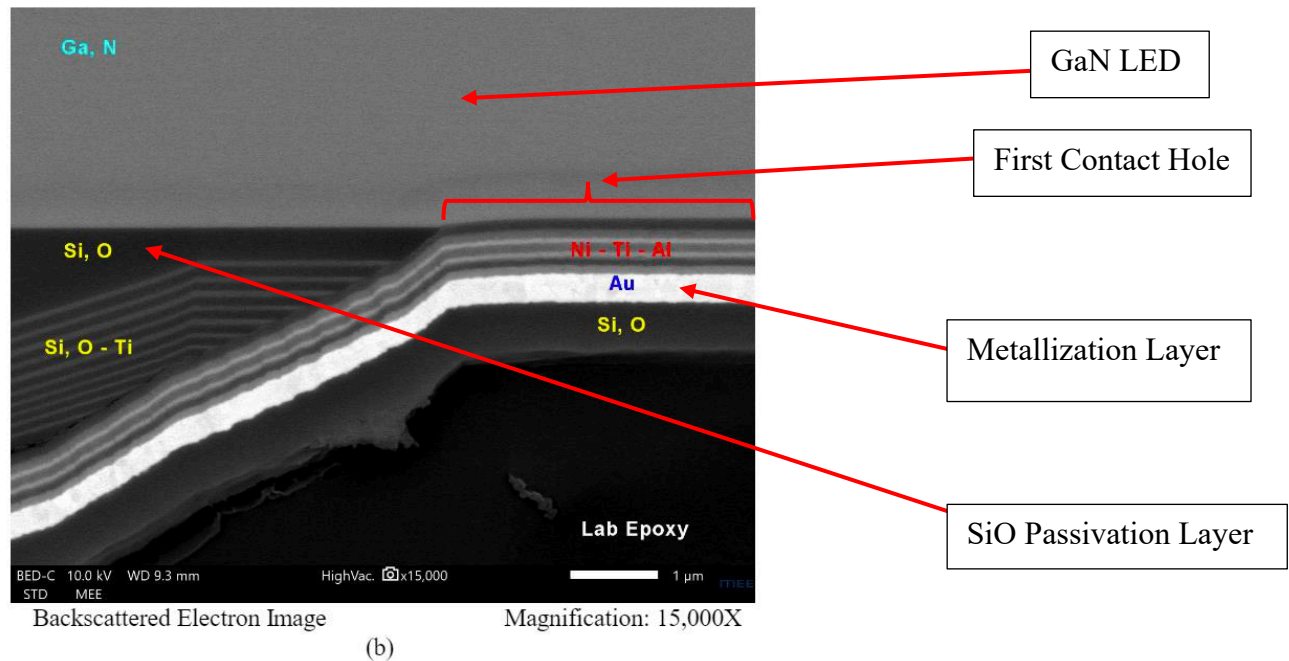
(b)



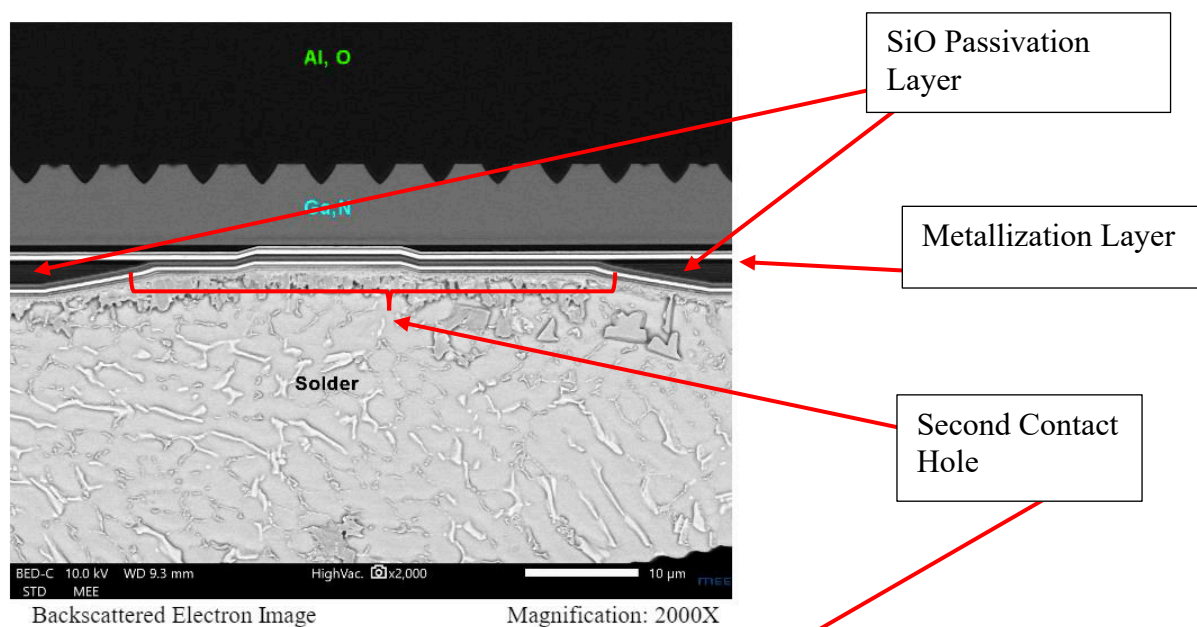


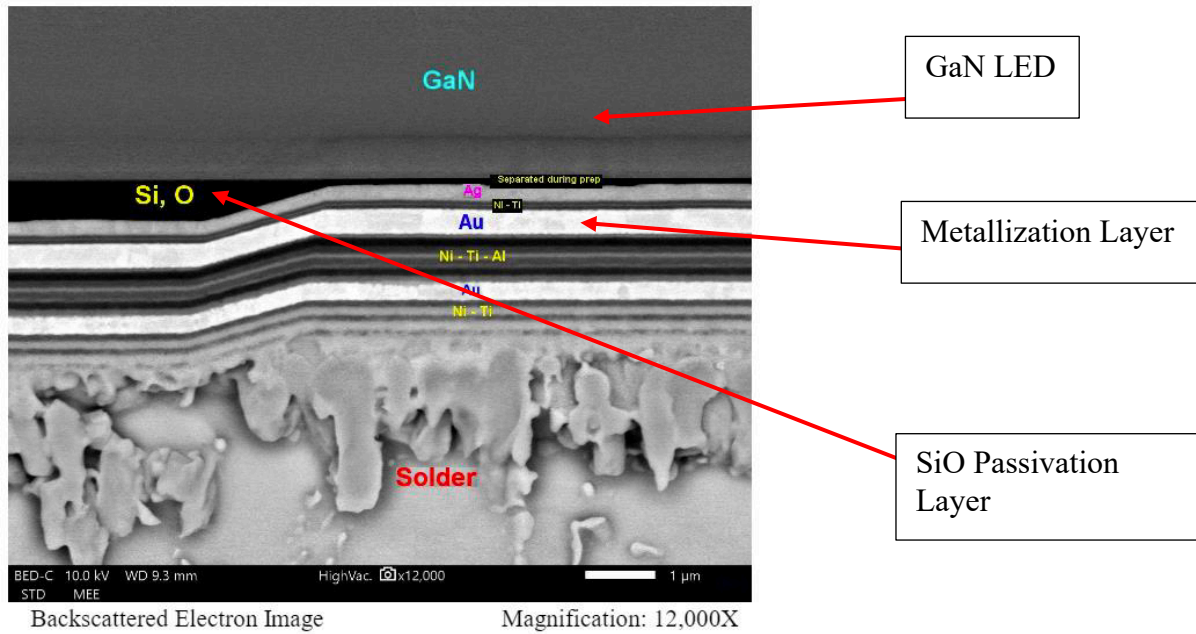
73. The passivation layer extends across the entire LED chip and is in direct contact with the optically permissive layer (phosphor) and sapphire layer (aluminum oxide) at the edge of the chip.

74. The upper metallization layer is in direct contact with the negatively doped GaN LED through a first contact hole in the SiO passivation layer. Outside the first contact hole, the SiO passivation layer separates the metallization layer from the GaN LED.

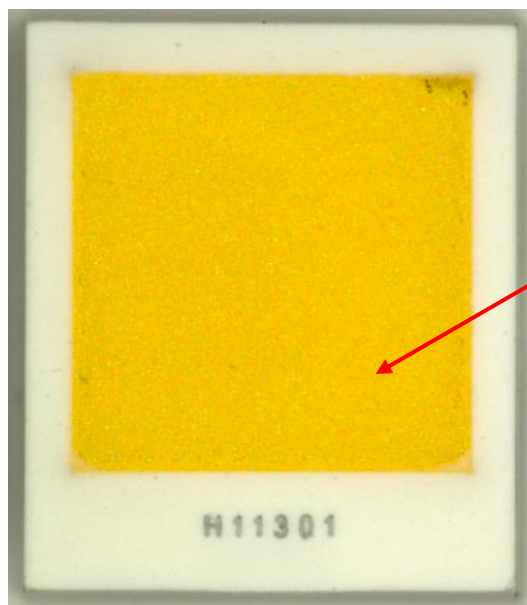


75. The lower metallization layer is in direct contact with the positively doped GaN LED through a second contact hole in the SiO passivation layer. Outside the first contact hole, the SiO passivation layer separates the metallization layer from the GaN LED.

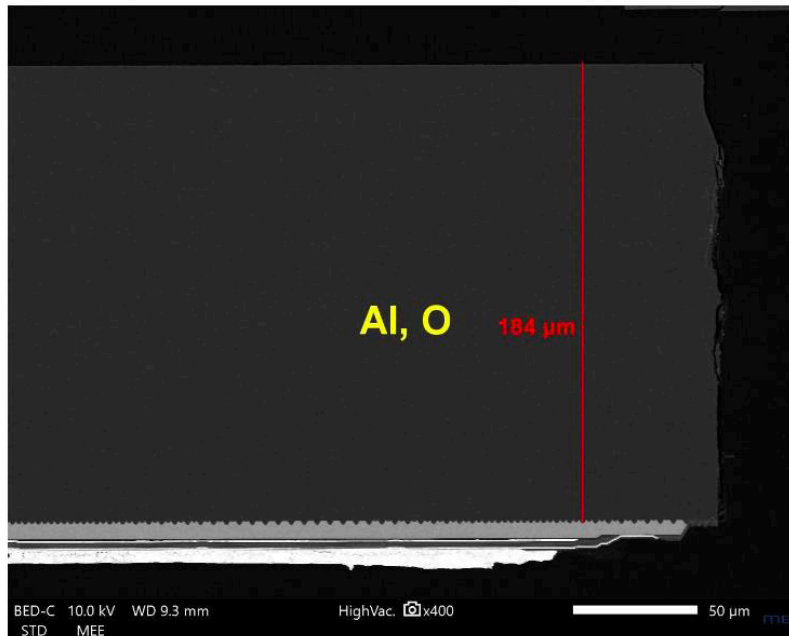




76. The surfaces of the metallization layer, the GaN LED, and the phosphor optically permissive layer are parallel with one another.



Phosphor optically transmissive layer is coated on top of the Samsung Galaxy S8's LED, so its surface is parallel to the top of the LED. The top of the LED is parallel to the bottom. Said upper metal surface, said lower metal surface, said negatively-doped surface, said positively-doped surface are parallel.



### **Willful Infringement**

77. Upon information and belief, Defendants have had actual knowledge (or should have been aware) of the '405 Patent and its infringement since at least 2013.

78. By at least 2013, Viagan (the previous owner of the patents prior to their assignment to LED Wafer Solutions LLC) had a series of meetings with technical personnel at Samsung.

79. On information and belief, at least Peter JH Lee, a senior researcher at Samsung, had access to technical information from Viagan.

80. Upon information and belief, at least some of this technical material described Viagan's LED technology and clearly stated that Viagan had five pending patent applications.

81. Further, Defendants have had actual knowledge of the '405 Patent and its infringement since at least service of Plaintiff's Complaint.

82. Although Samsung has incorporated Viagan's patented technology as set forth in this Complaint, Samsung has no license to use the technology described in Viagan's technical materials and claims and disclosed in the patents, which have now been assigned to LED Wafer Solutions LLC

83. Defendants' risk of infringement of the patents-in-suit was either known or was so obvious that it should have been known to Defendants.

84. Notwithstanding this knowledge, Defendants have knowingly or with reckless disregard willfully infringed the '405 Patent. Defendants have thus had actual notice of the infringement of the '405 Patent and acted despite an objectively high likelihood that their actions constituted infringement of Plaintiff's valid patent rights, either literally or equivalently.

85. This objective risk was either known or so obvious that it should have been known to Defendants. Accordingly, Defendants' infringement has been and continues to be willful, and Plaintiff seeks enhanced damages pursuant to 35 U.S.C. §§ 284 and 285.

#### **Indirect, Induced, and Contributory Infringement**

86. Defendants have induced and are knowingly inducing their distributors, testers, trainers, customers, and/or end-users to directly infringe the '405 Patent, with the specific intent to induce acts constituting infringement, and knowing that the induced acts constitute patent infringement, either literally or equivalently.

87. Defendants have knowingly contributed to direct infringement by their customers by having imported, sold, and/or offered for sale, and knowingly importing,

selling, and/or offering to sell within the United States the '405 Accused Products which are not suitable for substantial non-infringing use and which are especially made or specially adapted for use by its customers in an infringement of the asserted patent.

88. Defendants' indirect infringement includes, for example, providing data sheets, technical guides, demonstrations, software and hardware specifications, installation guides, and other forms of support that induce their customers and/or end-users to directly infringe the '405 Patent.

89. Defendants' indirect infringement additionally includes marketing their products for import by their customers into the United States. Defendants' indirect infringement further includes providing product specifications instructing its customers on infringing uses of the accused products. The '405 Accused Products are designed in such a way that when they are used for their intended purpose, the user infringes the '405 Patent, either literally or equivalently. Defendants know and intend that customers who purchase the '405 Accused Products will use those products for their intended purpose. For example, Defendant's United States website, <https://www.samsung.com>, instructs customers to use the '405 Accused Products in numerous infringing applications. Defendants' customers directly infringe the '405 patent when they follow Defendant's provided instructions. Defendants specifically intend that their customers, such as United States distributors, retailers and consumer product companies, will import, use, and sell infringing products in the

United States to serve and develop the United States market for Defendants' infringing products.

90. Defendants know following their instructions directly infringes claims of the '405 Patent and Defendants' customers who follow Defendants' provided instructions directly infringe the '405 Patent.

91. As a result of Defendants' infringement, Plaintiff has suffered monetary damages, and is entitled to an award of damages adequate to compensate it for such infringement which, by law, can be no less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

**COUNT THREE**  
**INFRINGEMENT OF U.S. PATENT 9,502,612**

92. Plaintiff incorporates by reference the allegations in preceding paragraphs 1 – 15 as if fully set forth herein.

93. The '612 Patent, entitled "LIGHT EMITTING DIODE PACKAGE WITH ENHANCED HEAT CONDUCTION," was filed on October 7, 2013, claims priority to a provisional application filed on September 20, 2009, and issued on November 22, 2016.

94. Plaintiff is the assignee and owner of all rights, title, and interest to the '612 Patent, including the right to recover for past infringements, and has the legal right to enforce the patent, sue for infringement, and seek equitable relief and damages.

**Technical Description**

95. The '612 Patent claims a “light emitting diode (LED) device and packaging with enhanced heat conduction.” '612 Patent, abstract. LED “is a semiconductor device that is configured to receive electrical power to simulate an output of electromagnetic radiation commonly in the visible range of the [light] spectrum.” '612 Patent, 1:29-32. “Packaging of electronic devices, such as light emitting diodes (LEDs) and other devices, represent a major cost in the production of electronic parts. In one non-limiting example, LEDs which offer long lifetime, compact form factor, [s]uperior energy efficiency, and RohS compliancy are expensive due to the packaging requirements which include sealing, optics, phosphor and efficient heat conduction. There have been numerous efforts to reduce the cost of the electronic device packaging by using [silicon-based] wafer level assembly technologies. However, these approaches still require a carrier chip for the electronic device and in most cases the carrier chip doubles the cost, and in the case of an LED triples the heat resistivity.” '612 Patent, 1:40-52. Despite the efforts made to reduce the cost of conventional LED packaging, such as Wafer Level assembly Packaging (WPL), these techniques still require the use of carrier substrate to support the LED, which can increase the cost of making and packaging the LED device. '612 Patent, 3:17-38. “In addition, the carrier Substrate greatly increases the thermal resistivity of the device and adversely affects its heat removal characteristics. Hence it is desirable to provide a wafer level package for LEDs which does not require any carrier substrate and uses the LED die only, alternatively, the package provides a direct



thermal connection from the LED to the heat sink for efficient removal of the generated heat.” ’612 Patent, 3:39-46.

96. The ’612 Patent provides a technical solution to prior art problems by providing a LED package which removes heat and reflects optical energy away from a carrier wafer. ’612 Patent, 3:54-55. “an improved LED in a wafer level processed (WLP) package is disclosed using vias in the silicon to route the electrical connections to the LED backside and a dedicated hole in the silicon with a direct heat conduction route from the LED to the printed circuit board.” ’612 Patent, 3:56-60.

### **Direct Infringement**

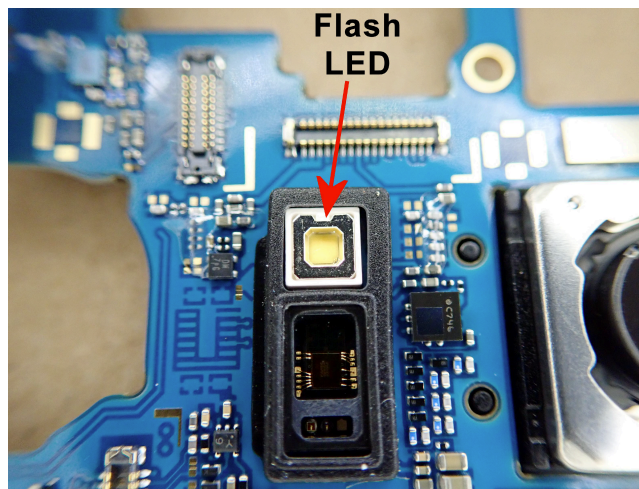
97. Defendants, individually and collectively as a common business enterprise and without authorization or license from Plaintiff, have been and are directly infringing the ’612 Patent, either literally or equivalently, as infringement is defined by 35 U.S.C. § 271, including through making, using (including for testing purposes), importing, selling, and offering for sale LEDs that infringe one or more claims of the ’612 Patent. Defendants, individually and collectively as a common business enterprise, develop, design, manufacture, sell, and distribute LEDs that infringe one or more claims of the ’612 Patent. Defendants further provide services that practice methods that infringe one or more claims of the ’612 Patent. Defendants are thus liable for direct infringement pursuant to 35 U.S.C. § 271. Exemplary infringing products include, but are not limited to, the Galaxy S8 mobile phone and Samsung LM101A Series LED and all other substantially similar devices.

98. Plaintiff names these exemplary infringing instrumentalities to serve as notice of Defendants' infringing acts, but Plaintiff reserves the right to name additional infringing products, known to or learned by Plaintiff or revealed during discovery, and include them in the definition of '612 Accused Products.

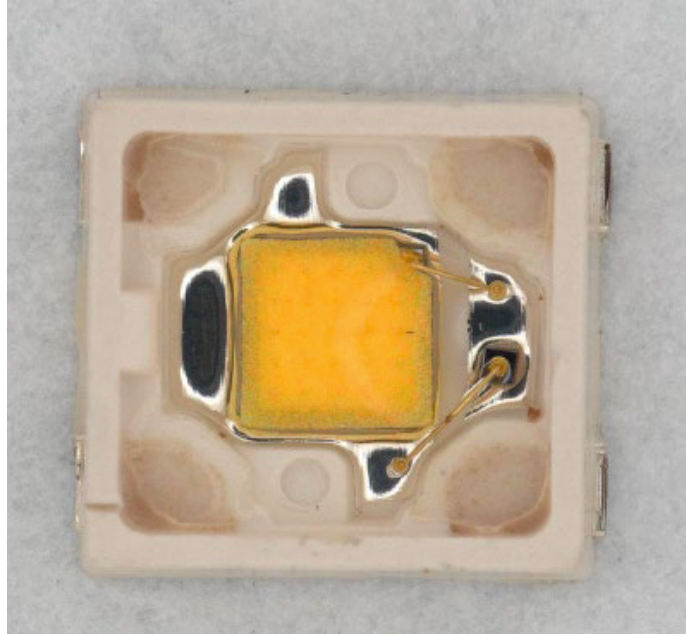
99. Defendants are liable for direct infringement pursuant to 35 U.S.C. § 271 for the manufacture, sale, offer for sale, importation, or distribution of the Samsung Galaxy S8 mobile phone and Samsung LED backlight strips.

100. The Samsung Galaxy S8 mobile phone has a flash LED that is a non-limiting example of a LED that meets all limitations of claim 1 of the '612 Patent, either literally or equivalently.

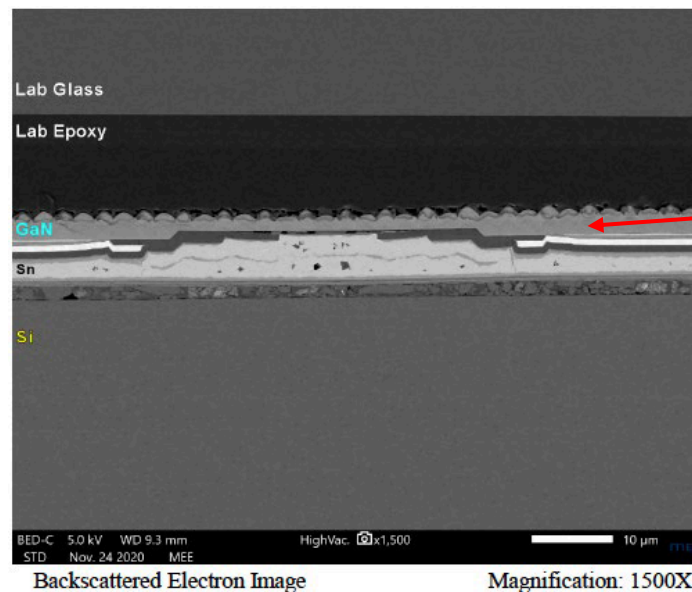
101. The Samsung Galaxy S8 has a light emitting device (LED) that serves as a flash for the camera, as well as a light source for various applications:



102. The Samsung Galaxy S8's LED comprises a substrate that is a yellowish layer containing phosphor opposing first and second surfaces. The phosphor substrate changes the blue light emitted from the LED into white light.



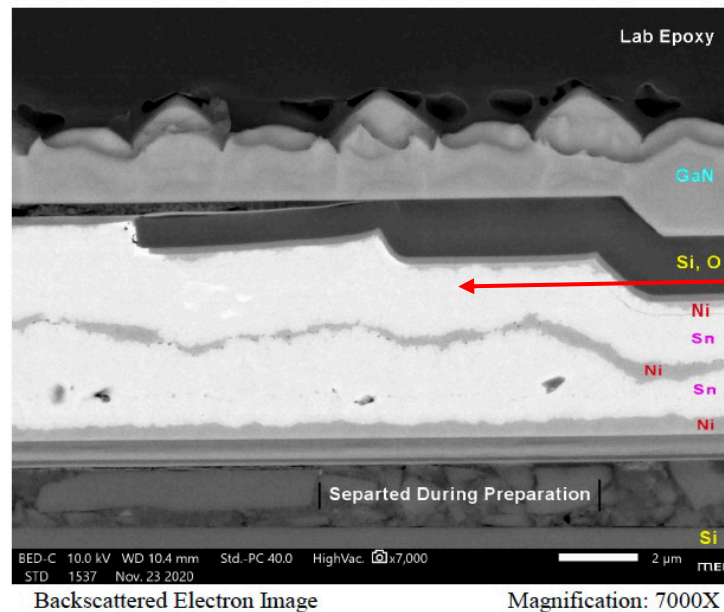
103. The Samsung Galaxy S8's LED is a semiconductor LED including a doped GaN LED. The LED has a positively doped region, a negatively doped region, and an intrinsic region between the positively doped region and the negatively doped region. The intrinsic region lies between the two doped regions.



GaN disposed on  
first LED surface  
that emits light

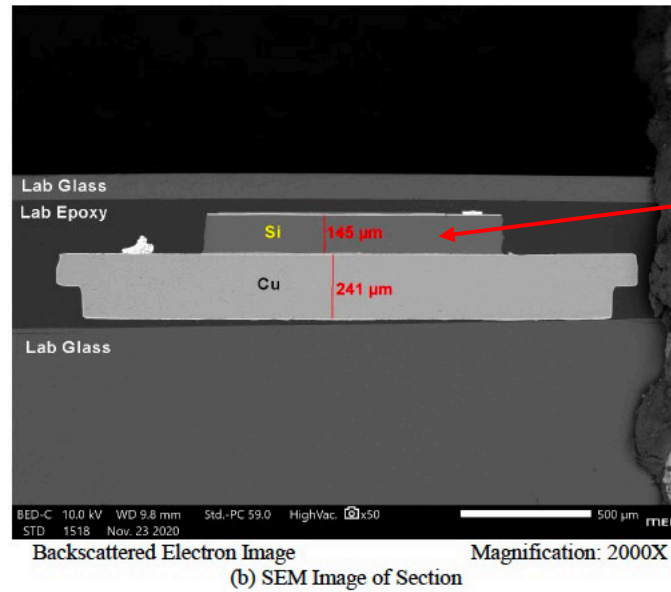
104. The negatively doped region of GaN corresponds to the cathode while the positively doped region of GaN corresponds to the anode of the LED. Such doping is required for a LED to function. The intrinsic region lies between the two doped regions. The LED GaN layer includes a surface disposed on the first side of the first substrate surface, i.e., one surface of the GaN layer is disposed on the surface of the yellowish phosphor substrate

105. The other side of the Samsung Galaxy S8's LED has a thermally conductive layer made up of various metals.



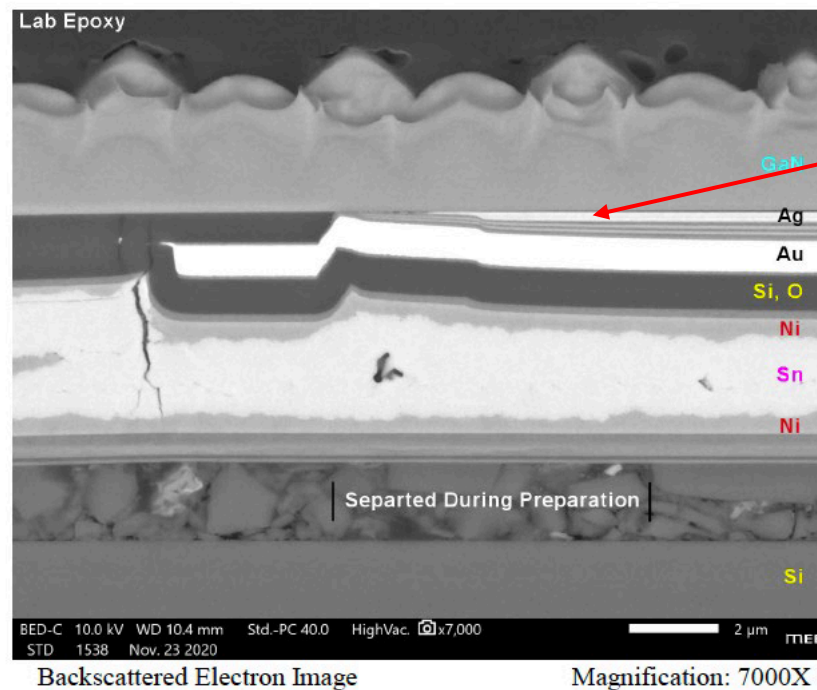
Thermally conductive layer on the opposite surface of the LED

106. The Samsung Galaxy S8's LED has a silicon carrier wafer that is disposed on the thermally conductive layers made up of various metals.



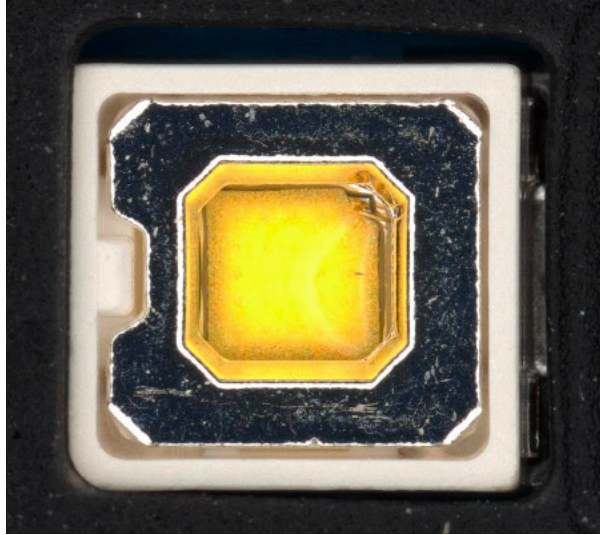
Si carrier wafer  
beneath the GaN and  
metallic thermally  
conductive layer

107. The Samsung Galaxy S8's LED has an optically reflective silver surface is disposed between the carrier wafer and the semiconductor LED.

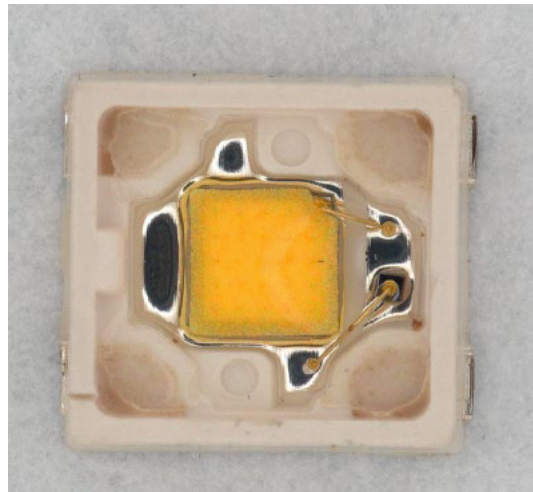


Silver (Ag) surface  
between the Si carrier  
wafer and the GaN  
semiconductor

108. On the opposing surface of the yellowish phosphor substrate from the Samsung Galaxy S8's LED, there is a substantially optically transmissive layer, the “cover substrate” made of silicon

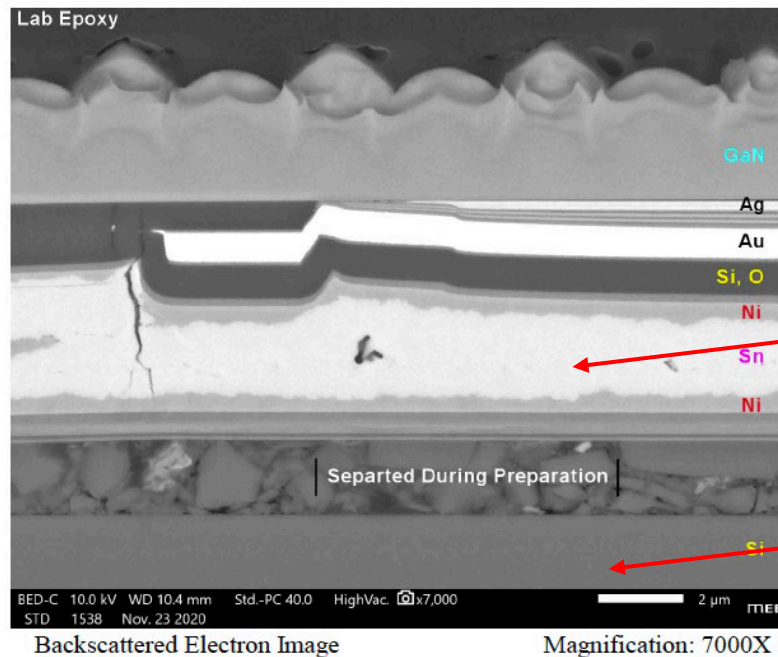


109. The optically transmissive layer that covers the substrate may be removed to expose the remaining layers of the Samsung Galaxy S8's LED



110. The silicon carrier wafer and the thermally conductive metallic layers are connected to the Samsung Galaxy S8's second LED surface in order to provide relief from heat.





Thermally conductive metallic layer connected to second LED surface to relieve heat

Silicon carrier wafer connected to second LED surface to relieve heat

### **Willful Infringement**

111. Upon information and belief, Defendants have had actual knowledge (or should have been aware) of the '612 Patent and its infringement since at least 2013.

112. By at least 2013, Viagan (the previous owner of the patents prior to their assignment to LED Wafer Solutions LLC) had a series of meetings with technical personnel at Samsung.

113. On information and belief, at least Peter JH Lee, a senior researcher at Samsung, had access to technical information from Viagan.

114. Upon information and belief, at least some of this technical material described Viagan's LED technology and clearly stated that Viagan had five pending patent applications.

115. Further, Defendants have had actual knowledge of the '612 Patent and its infringement since at least service of Plaintiff's Complaint.

116. Although Samsung has incorporated Viagan's patented technology as set forth in this Complaint, Samsung has no license to use the technology described in Viagan's technical materials and claims and disclosed in the patents, which have now been assigned to LED Wafer Solutions LLC

117. Defendants' risk of infringement of the patents-in-suit was either known or was so obvious that it should have been known to Defendants.

118. Notwithstanding this knowledge, Defendants have knowingly or with reckless disregard willfully infringed the '612 Patent. Defendants have thus had actual notice of the infringement of the '612 Patent and acted despite an objectively high likelihood that their actions constituted infringement of Plaintiff's valid patent rights, either literally or equivalently.

119. This objective risk was either known or so obvious that it should have been known to Defendants. Accordingly, Defendants' infringement has been and continues to be willful, and Plaintiff seeks enhanced damages pursuant to 35 U.S.C. §§ 284 and 285.

#### **Indirect, Induced, and Contributory Infringement**

120. Defendants have induced and are knowingly inducing their distributors, testers, trainers, customers, and/or end-users to directly infringe the '612 Patent, with the specific intent to induce acts constituting infringement, and knowing that the induced acts constitute patent infringement, either literally or equivalently.

121. Defendants have knowingly contributed to direct infringement by their customers by having imported, sold, and/or offered for sale, and knowingly importing,



selling, and/or offering to sell within the United States the '612 Accused Products which are not suitable for substantial non-infringing use and which are especially made or especially adapted for use by its customers in an infringement of the asserted patent.

122. Defendants' indirect infringement includes, for example, providing data sheets, technical guides, demonstrations, software and hardware specifications, installation guides, and other forms of support that induce their customers and/or end-users to directly infringe the '612 Patent.

123. Defendants' indirect infringement additionally includes marketing their products for import by their customers into the United States. Defendants' indirect infringement further includes providing product specifications instructing its customers on infringing uses of the accused products. The '612 Accused Products are designed in such a way that when they are used for their intended purpose, the user infringes the '612 Patent, either literally or equivalently. Defendants know and intend that customers who purchase the '612 Accused Products will use those products for their intended purpose. For example, Defendant's United States website, <https://www.samsung.com>, instructs customers to use the '612 Accused Products in numerous infringing applications. Defendants' customers directly infringe the '612 Patent when they follow Defendant's provided instructions. Defendants specifically intend that their customers, such as United States distributors, retailers and consumer product companies, will import, use, and sell infringing products in the

United States to serve and develop the United States market for Defendants' infringing products.

124. Defendants know following their instructions directly infringes claims of the '612 Patent and Defendants' customers who follow Defendants' provided instructions directly infringe the '612 Patent.

125. As a result of Defendants' infringement, Plaintiff has suffered monetary damages, and is entitled to an award of damages adequate to compensate it for such infringement which, by law, can be no less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

**COUNT FOUR**  
**INFRINGEMENT OF U.S. PATENT 9,786,822**

126. Plaintiff incorporates by reference the allegations in preceding paragraphs 1 – 15 as if fully set forth herein.

127. The '822 Patent, entitled "LIGHT EMITTING DIODE PACKAGE AND METHOD OF MANUFACTURE," was filed on December 15, 2014, claims priority to a parent Patent number 8,941,137 filed on March 6, 2012, and issued on October 10, 2017.

128. Plaintiff is the assignee and owner of all rights, title, and interest to the '822 Patent, including the right to recover for past infringements, and has the legal right to enforce the patent, sue for infringement, and seek equitable relief and damages.

**Technical Description**

129. The '822 Patent claims a “light emitting diode (LED) device and packaging . . . manufactured using a vertical configuration including a plurality of layers.” '822 Patent, abstract.

130. LEDs “compare favorably to other sources of light and are especially useful in certain applications and markets [by providing] advantages with respect to energy efficiency, compact, rugged long-lasting design and form factor, as well as other advantages.” '822 Patent, 1:27-39. Prior art and “conventional LED devices [however] can be relatively costly to manufacture by some metrics when compared to other light sources. One reason for this is the exacting packaging requirements for manufacturing LEDs. [C]onventional techniques require the use of a carrier substrate to support the LED, which can double the cost of making and packaging the LED device. In addition, the carrier substrate greatly increases the thermal resistivity of the device and adversely affects its heat removal characteristics. Accordingly, there is a need for LED devices that do not suffer from [these] problems.” '822 Patent, 1:27-62.

131. The '822 Patent provides a technical solution to prior art problems by providing a LED having a plurality of layers. “Certain layers act to promote mechanical, electrical, thermal, or optical characteristics of the device. The device avoids design problems, including manufacturing complexities, costs and heat dissipation problems found in conventional LEDs.” '822 Patent, 2:2-10. The layers may include “a semiconductor LED including doped and intrinsic regions thereof; a conducting carrier layer disposed proximal to a first surface of said semiconductor

LED and separated therefrom by a metallic interface; an optically permissive layer proximal to a second surface of said semiconductor LED, said first and second surfaces of said semiconductor LED being on opposing faces thereof, an optically definable material proximal to or within said optically permissive layer that affects an optical characteristic of emitted light passing therethrough; and an optically permissive cover substrate covering at least a portion of the above components.” ’822 Patent, 2:12-24.

### **Direct Infringement**

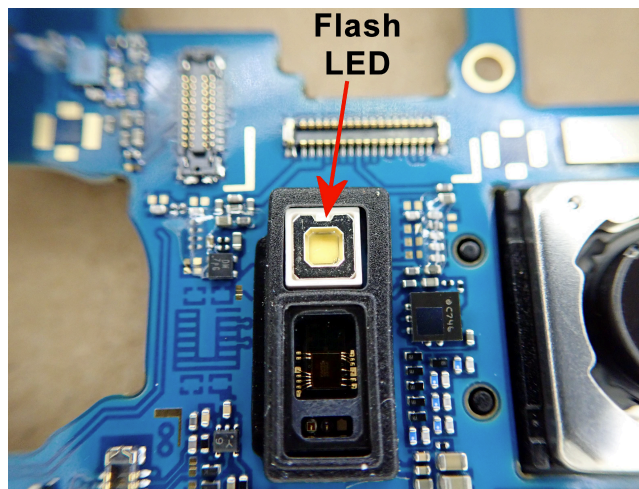
132. Defendants, individually and collectively as a common business enterprise and without authorization or license from Plaintiff, have been and are directly infringing the ’822 Patent, either literally or equivalently, as infringement is defined by 35 U.S.C. § 271, including through making, using (including for testing purposes), importing, selling, and offering for sale LEDs that infringe one or more claims of the ’822 Patent. Defendants, individually and collectively as a common business enterprise, develop, design, manufacture, sell, and distribute LEDs that infringe one or more claims of the ’822 Patent. Defendants further provide services that practice methods that infringe one or more claims of the ’822 Patent. Defendants are thus liable for direct infringement pursuant to 35 U.S.C. § 271. Exemplary infringing products include, but are not limited to, the Samsung Galaxy S8 mobile phone, the Samsung TU8000 Smart Television, and Samsung LM101A Series LED and all other substantially similar products.

133. Plaintiff names these exemplary infringing instrumentalities to serve as notice of Defendants' infringing acts, but Plaintiff reserves the right to name additional infringing products, known to or learned by Plaintiff or revealed during discovery, and include them in the definition of '822 Accused Products.

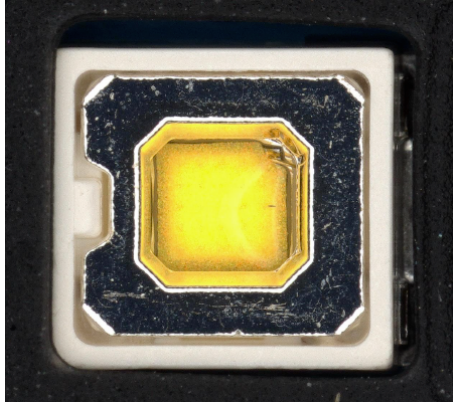
134. Defendants are liable for direct infringement pursuant to 35 U.S.C. § 271 for the manufacture, sale, offer for sale, importation, or distribution of the Samsung Galaxy S8 mobile phone and Samsung LED backlight strips.

135. The Samsung Galaxy S8 mobile phone has a flash LED that is a non-limiting example of a LED that meets all limitations of claim 1 of the '822 Patent, either literally or equivalently.

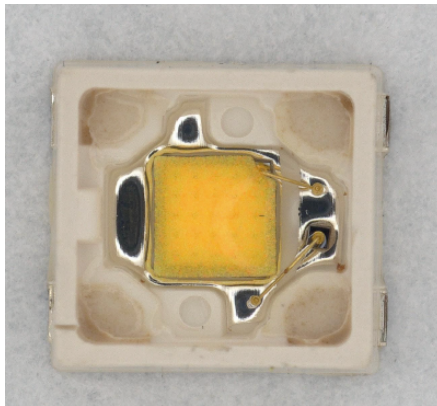
136. The Samsung Galaxy S8 has a light emitting device (LED) that serves as a flash for the camera, as well as a light source for various applications:



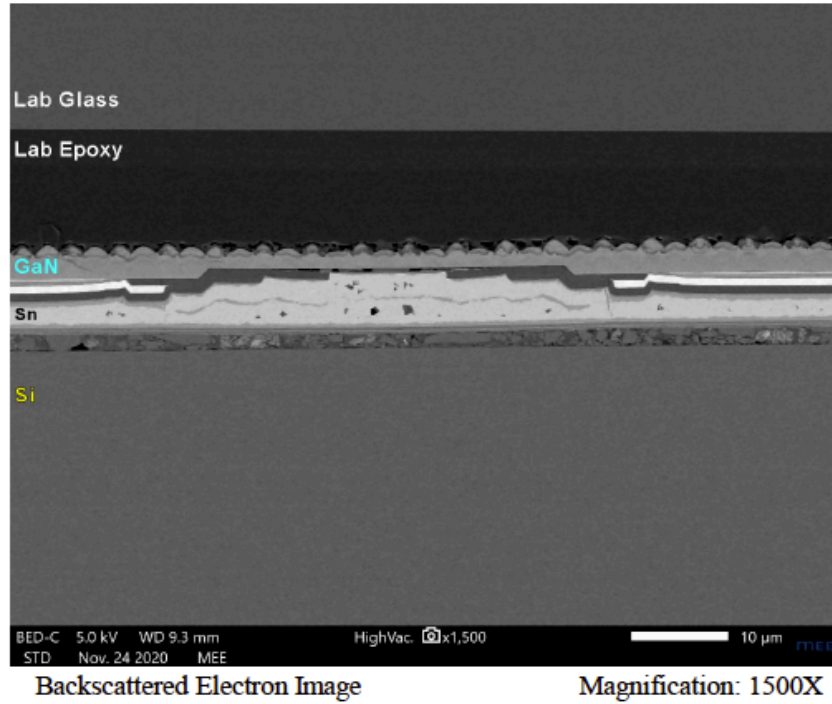
137. The Samsung Galaxy S8's flash LED is protected by an optically transparent cover substrate:



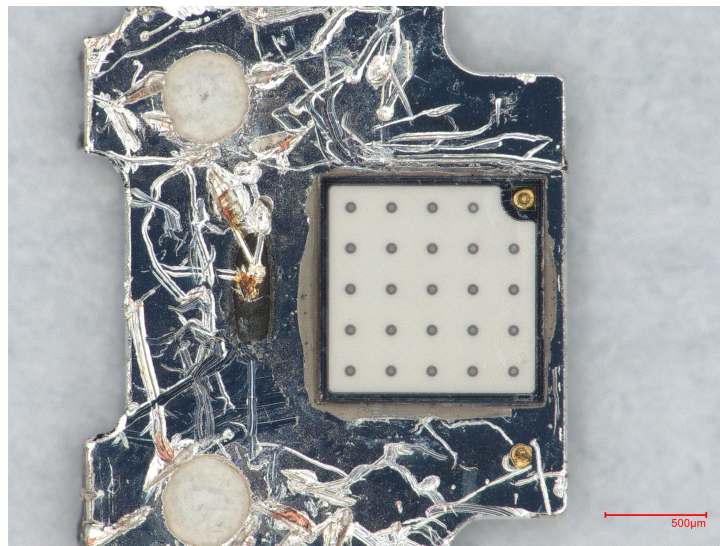
138. In Samsung Galaxy S8, beneath the optically transparent cover substrate, and attached to the cover substrate's bottom surface, is an optically transparent layer including an optically definable material. The optically transparent layer is the yellow portion covering the LED, containing the optically definable material of phosphor, which changes the blue light emitted from the LED into white light.



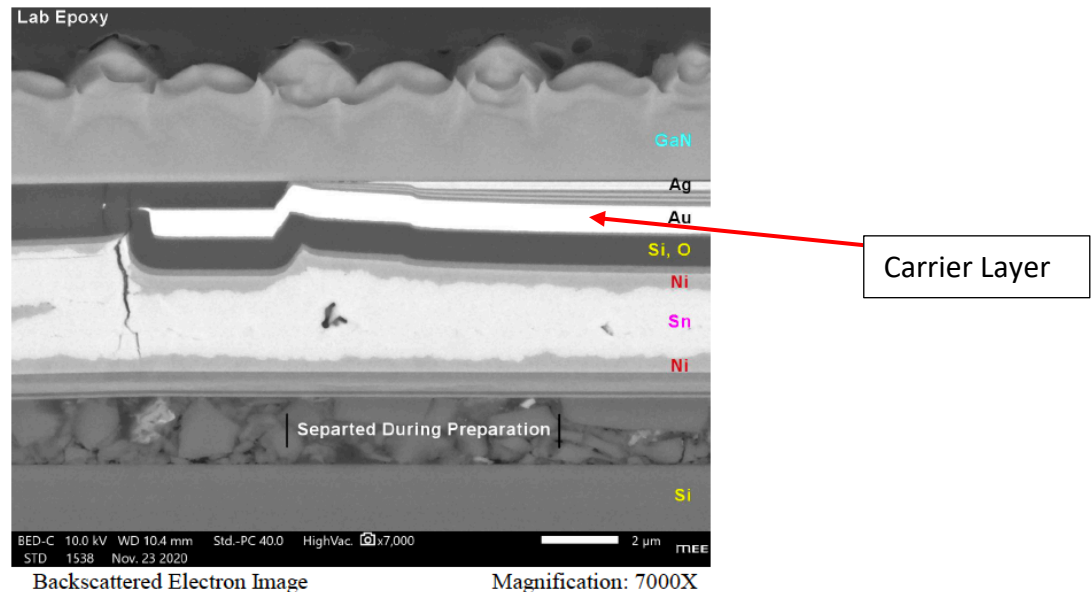
139. The Samsung Galaxy S8's LED is a doped GaN LED. The LED has a positively doped region, a negatively doped region, and an intrinsic region between the positively doped region and the negatively doped region. The phosphor active region is in contact with the GaN semiconductor.



140. The negatively doped region of GaN corresponds to the cathode while the positively doped region of GaN corresponds to the anode of the LED. The intrinsic region lies between the two doped regions. A surface of the semiconductor LED is in contact with the lower surface of the optically transparent layer (the yellow phosphor layer).



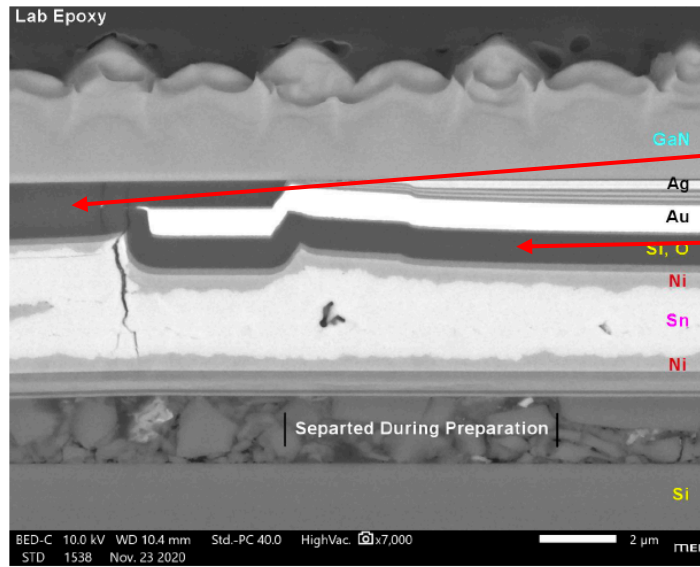
141. The Samsung Galaxy S8's LED has a carrier layer comprising conducting metals including gold, tin, nickel, and silver on the opposing side of the GaN LED from the optically transparent phosphor layer:



142. The carrier layer is the lower surface of the LED, whereas the surface in contact with the optically transparent layer is the upper surface. Therefore, the two surfaces are on opposing sides of the LED.

143. In Samsung Galaxy S8's LED, a passivation layer of silicon oxide is disposed on the carrier layer.

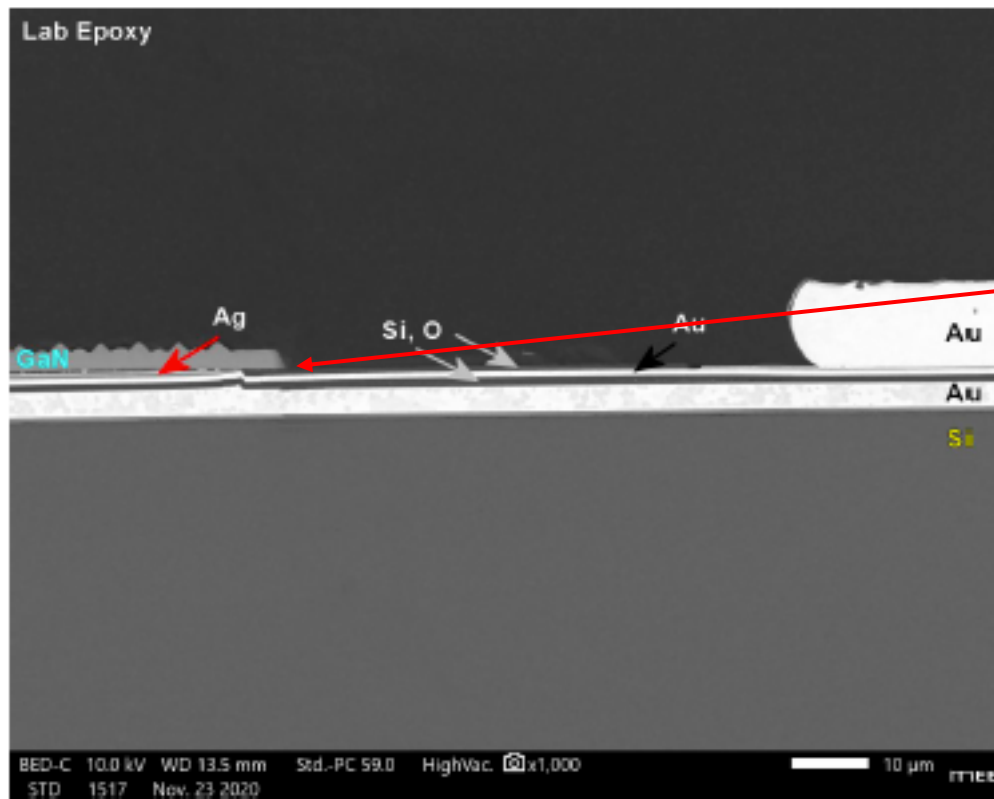




Backscattered Electron Image

Magnification: 7000X

Silicon Oxide Passivation Layer



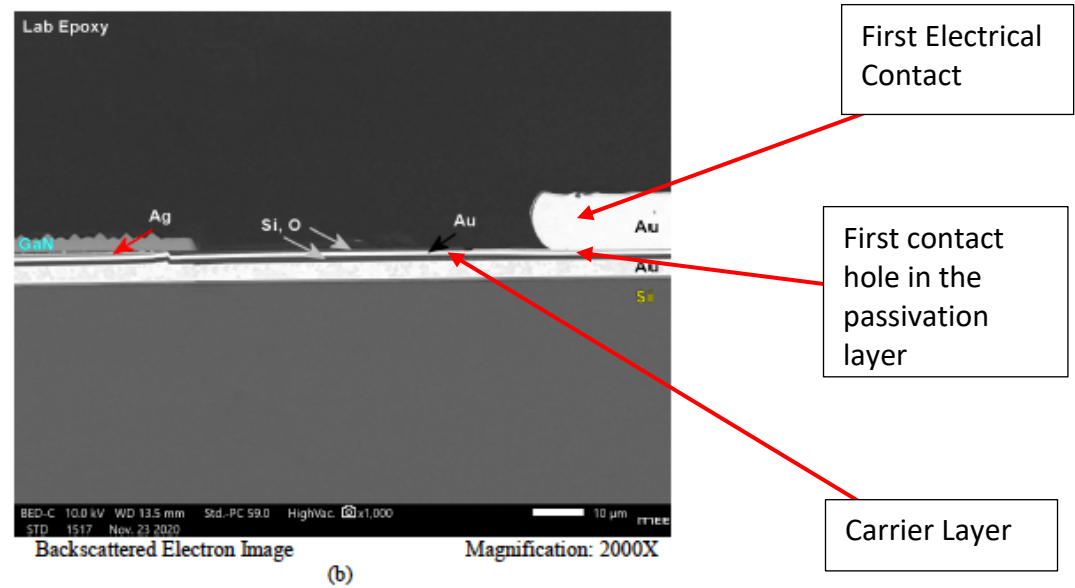
Backscattered Electron Image

Magnification: 2000X

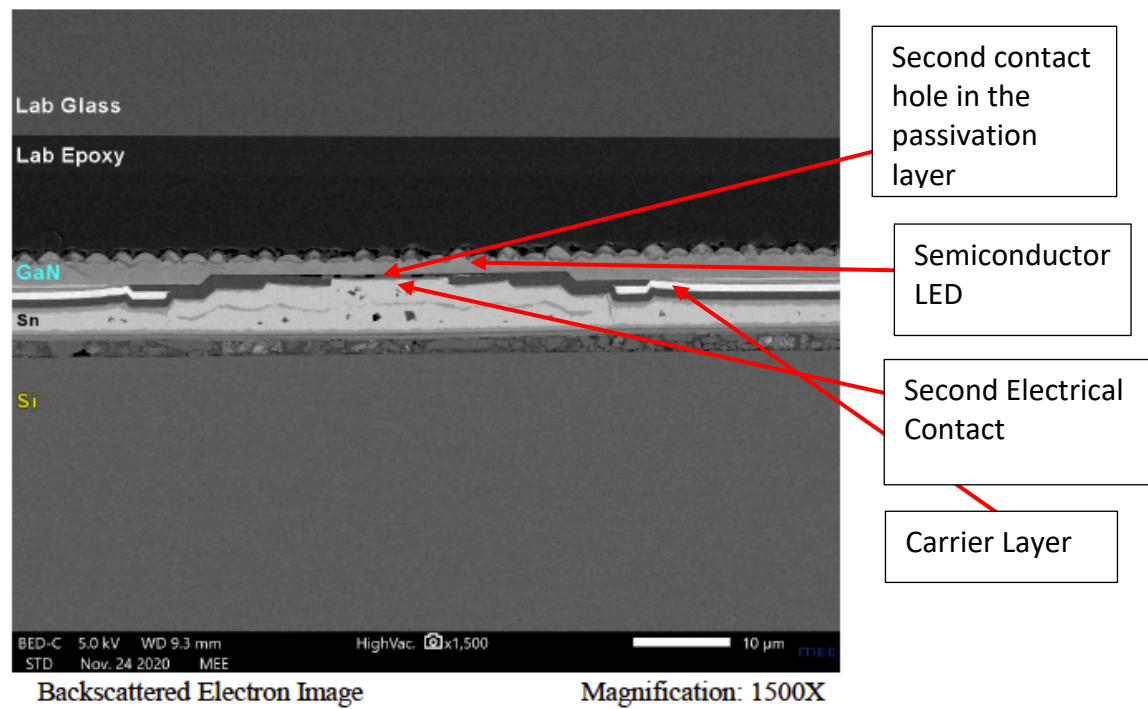
The Silicon Oxide Passivation Layer extends past the GaN layer and would be in contact with an exposed portion of the optically transparent layer

(b)

144. The Samsung Galaxy S8's LED has a first electrical contact is made with gold through a contact hole defined in the passivation layer:



145. The Samsung Galaxy S8's LED has a second electrical contact is made with the GaN on the carrier layer through a contact hole defined in the passivation layer, carrier layer, and LED.



146. The second electrical contact is in electrical communication with the first (upper) surface of the LED.

### **Willful Infringement**

147. Upon information and belief, Defendants have had actual knowledge (or should have been aware) of the '822 Patent and its infringement since at least 2013.

148. By at least 2013, Viagan (the previous owner of the patents prior to their assignment to LED Wafer Solutions LLC) had a series of meetings with technical personnel at Samsung.

149. On information and belief, at least Peter JH Lee, a senior researcher at Samsung, had access to technical information from Viagan.

150. Upon information and belief, at least some of this technical material described Viagan's LED technology and clearly stated that Viagan had five pending patent applications.

151. Further, Defendants have had actual knowledge of the '822 Patent and its infringement since at least service of Plaintiff's Complaint.

152. Although Samsung has incorporated Viagan's patented technology as set forth in this Complaint, Samsung has no license to use the technology described in Viagan's technical materials and claims and disclosed in the patents, which have now been assigned to LED Wafer Solutions LLC

153. Defendants' risk of infringement of the patents-in-suit was either known or was so obvious that it should have been known to Defendants.

154. Notwithstanding this knowledge, Defendants have knowingly or with reckless disregard willfully infringed the '822 Patent. Defendants have thus had actual notice of the infringement of the '822 Patent and acted despite an objectively high likelihood that their actions constituted infringement of Plaintiff's valid patent rights, either literally or equivalently.

155. This objective risk was either known or so obvious that it should have been known to Defendants. Accordingly, Defendants' infringement has been and continues to be willful, and Plaintiff seeks enhanced damages pursuant to 35 U.S.C. §§ 284 and 285.

#### **Indirect, Induced, and Contributory Infringement**

156. Defendants have induced and are knowingly inducing their distributors, testers, trainers, customers, and/or end-users to directly infringe the '822 Patent, with the specific intent to induce acts constituting infringement, and knowing that the induced acts constitute patent infringement, either literally or equivalently.

157. Defendants have knowingly contributed to direct infringement by their customers by having imported, sold, and/or offered for sale, and knowingly importing, selling, and/or offering to sell within the United States the '822 Accused Products which are not suitable for substantial non-infringing use and which are especially made or especially adapted for use by its customers in an infringement of the asserted patent.

158. Defendants' indirect infringement includes, for example, providing data sheets, technical guides, demonstrations, software and hardware specifications,

installation guides, and other forms of support that induce their customers and/or end-users to directly infringe the '822 Patent.

159. Defendants' indirect infringement additionally includes marketing their products for import by their customers into the United States. Defendants' indirect infringement further includes providing product specifications instructing its customers on infringing uses of the accused products. The '822 Accused Products are designed in such a way that when they are used for their intended purpose, the user infringes the '822 Patent, either literally or equivalently. Defendants know and intend that customers who purchase the '822 Accused Products will use those products for their intended purpose. For example, Defendant's United States website, <https://www.samsung.com>, instructs customers to use the '822 Accused Products in numerous infringing applications. Defendants' customers directly infringe the '822 patent when they follow Defendant's provided instructions. Defendants specifically intend that their customers, such as United States distributors, retailers and consumer product companies, will import, use, and sell infringing products in the United States to serve and develop the United States market for Defendants' infringing products.

160. Defendants know following their instructions directly infringes claims of the '822 Patent and Defendants' customers who follow Defendants' provided instructions directly infringe the '822 Patent.

161. As a result of Defendants' infringement, Plaintiff has suffered monetary damages, and is entitled to an award of damages adequate to compensate it for such

infringement which, by law, can be no less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

## **V. NOTICE**

162. LED Wafer has complied with the notice requirement of 35 U.S.C. § 287. This notice requirement has been complied with by all relevant persons at all relevant times.

## **VI. JURY DEMAND**

163. Plaintiff demands a trial by jury of all matters to which it is entitled to trial by jury, pursuant to FED. R. CIV. P. 38.

## **VII. PRAYER FOR RELIEF**

WHEREFORE, Plaintiff prays for judgment and seeks relief against Defendants as follows:

- A. That the Court determined that one or more claims of the Asserted Patents is infringed by Defendants, both literally and under the doctrine of equivalents;
- B. That the Court determine that one or more claims of the Asserted Patents is indirectly infringed by Defendants;
- C. That the Court award damages adequate to compensate Plaintiff for the patent infringement that has occurred, together with prejudgment and post-judgment interest and costs, and an ongoing royalty for continued infringement;

- D. That the Court permanently enjoin Defendants pursuant to 35 U.S.C. § 283;
- E. That the Court find this case to be exceptional pursuant to 35 U.S.C. § 285;
- F. That the Court determined that Defendants' infringements were willful;
- G. That the Court award enhanced damages against Defendants pursuant to 35 U.S.C. § 284;
- H. That the Court award reasonable attorneys' fees; and
- I. That the Court award such other relief to Plaintiff as the Court deems just and proper.

Dated: March 25, 2021

Respectfully Submitted,

/s/ E. Leon Carter

E. Leon Carter

lcarter@carterarnett.com

Texas Bar No. 03914300

Scott W. Breedlove

sbreedlove@carterarnett.com

State Bar No. 00790361

Joshua J. Bennett

jbennett@carterarnett.com

Texas Bar No. 24059444

Bradley D. Liddle

bliddle@carterarnett.com

Texas Bar No. 24074599

Nathan Cox

ncox@carterarnett.com

Texas Bar No. 24105751

CARTER ARNETT PLLC

8150 N. Central Expy, 5th Floor

Dallas, Texas 75206

Telephone No. (214) 550-8188

Facsimile No. (214) 550-8185

/s/ Erick S. Robinson

Erick S. Robinson

erobinson@porterhedges.com

Texas Bar No. 24039142

PORTER HEDGES LLP

1000 Main Street, 36th Floor

Houston, Texas 77002

Telephone No. (713) 226-6615

Facsimile No. (713) 226-6215

**ATTORNEYS FOR PLAINTIFF**